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COLORADO

AS AN

AGRICULTURAL STATE.

ITS

FARMS, FIELDS, AND GARDEN LANDS.

BY

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IN COLORADO," ETC.

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TO

HON. JOHN S. STANGER,

OF DENVER,

EDITOR OF THE "COLORADO FARMER,"

AND

AN EARNEST ADVOCATE OF ALL THINGS PERTAINING TO THE

DEVELOPMENT OF THE AGRICULTURAL

RESOURCES OF COLORADO,

THIS VOLUME

IS DEDICATED, WITH SINCERE ESTEEM,

BY

HIS CO-LABORER AND FRIEND,

THE AUTHOR.

AUTHOR'S PREFACE.

In preparing this volume I have aimed to keep strictly within the border line of facts. Twelve years of careful observation, a personal acquaintance with nearly all the valleys described herein, an earnest desire to make public the agricultural resources of a State whose remarkable growth has no parallel in American history,—these have been impelling motives in the preparation of this truthful account of the valleys, plains, and parks of Colorado.

WILLIAM E. PABOR.

Shady Side, Argyle Park, near Denver, Dec., 1882.

TABLE OF CONTENTS.

PAGE

CHAPTER I.

Introductory.. 9

CHAPTER II.

Historical and Geographical........................ 19

CHAPTER III.

Colonization in Colorado........................... 27

CHAPTER IV.

Irrigation—Measurement of Water.................... 37

CHAPTER V.

Area Susceptible of Irrigation..................... 55

CHAPTER VI.

How Farming Pays................................... 60

CHAPTER VII.

Cache-la-Poudre Valley............................. 75

CHAPTER VIII.

Big Thompson, Little Thompson, St. Vrain........... 87

CHAPTER IX.

Boulder and Clear Creek Valleys.................... 93

CHAPTER X.

South Platte Valley................................ 99

CHAPTER XI.

Southern Colorado..................................110

CHAPTER XII.

San Luis Park..120

CHAPTER XIII.

Southwestern Colorado...142

CHAPTER XIV.

Artesian Wells—Reservoirs....................................150

CHAPTER XV.

Apiculture..157

CHAPTER XVI.

Fruit Growing...164

CHAPTER XVII.

Questions and Answers...173

CHAPTER XVIII.

Colorado Agricultural College...............................179

CHAPTER XIX.

Farming Journals...183

CHAPTER XX.

Cattle and Sheep...188

CHAPTER XXI.

The Railway System of the State............................202

CHAPTER XXII.

Garden Culture by Irrigation.................................207

COLORADO AS AN AGRICULTURAL STATE.

CHAPTER I.

INTRODUCTION.

“Far in the West there lies a desert land, where the mountains
Lift, through perpetual snows, their lofty and luminous summits.
* * * * * * * * *
And to the South, from the Fontaine-qui-bouille and the Spanish Sierras,
Fretted with sands and rocks, and swept by the wind of the desert,
Numberless torrents, with ceaseless sound, descend to the ocean,
Like the great chords of a harp, in loud and solemn vibrations.
Spreading between the streams are wondrous, beautiful prairies,
Billowy bays of grass are rolling in shadow and sunshine;
Bright with the luxurious clusters of roses and purple amorphas.
Over them wander the buffalo herds, and the elk, and the roebuck;
Over them wander the wolves and herds of riderless horses;
Fires that blast and blight, and winds that are weary with travel.
Over them wander the scattered tribes of Ishmael's children,
Staining the desert with blood, and above their terrible war-trail
Circles and sails afloat, on pinions majestic, the Vulture,
Like the implacable soul of a chieftain slaughtered in battle,
By invisible stairs ascending and scaling the heavens.
Here and there rise smokes from the camps of these savage marauders;
Here and there rise groves from the margins of swift-running rivers,
And the grim, taciturn bear, the anchorite monk of the desert,
Climbs down their dark ravines to dig for roots by the brookside;
While over all is the sky, the clear and crystalline heaven,
Like the protecting hand of God inverted above them.”

So wrote Henry W. Longfellow in years gone by. Then, no doubt, the picture was as truthful as the poem is still beautiful. The genius of the poet depicted in wild and weird verse the desert as it was. But now—now, “the clear and crystalline heaven” remains, but all else is changed, as by the hand of magic. Between Long's Peak, sentinelling the northern border of Colorado, and the Spanish Peaks, marking its southern boundary, the changes have been wondrous. "Billowy bays of grass" are still to be seen, but the buffalo and the elk have disappeared; wolves in countless multitudes, and riderless horses in mighty droves no longer wander over untenanted prairies. The Indian, "staining the desert with blood," has been driven further and further to the westward, until now he no longer hides in the foot-hills, or even in the rock palaces of the cliff dwellers in deep and dark mountain gorges far away in the Toltec ranges of the Sierras. A nation whose motto is civilization inhabits the land. The valleys that once were desolate are now alive with humanity, and each recurring summer sees them robed in verdure, fresh from the hand of Ceres. In the hills, where the bear, the lion, and the wolf once roamed, there are cities, towns, and innumerable mining camps, where thousands dig, and delve, and toil for gold that glitters, and silver that shines. In the valleys, where streams with limpid currents once ran unfettered to the plains on their journey to the sea, there are towns, where industries flourish, and hamlets, wherein center all the elements of social existence. The water, won by skill and enterprise from its accustomed channel, runs over fields and farms, and becomes, in the divine alchemy of Nature, as precious as were the words that dropped from the mouth of the princess in the fairy tale, changing, in the dropping, to priceless pearls. Seed-time and harvest, once suggested as a possibility, have become a certainty in Colorado. The system of soil-culture, old, almost, as the history of civilization, common in the ancient lands of Asia and Africa, where art has been brought to the aid of nature, and the economies of earth-culture advanced to the highest perfection, is here revived on soil older, perhaps, than the soil of Egypt. Mother Earth yields a bountiful return to all who approach her with open hands. These she fills, in due season, out of her abundant store, and promises still greater abundance, when wider experience and sounder wisdom are brought to the aid of the soil-tiller, who is also the bread-winner and the world-feeder.

The first question that will be asked by those who think of settling in Colorado is this: "Is Colorado a farming country?" Supplementary to this comes the query, "Does it pay to farm in Colorado?" I propose to consider these questions, and answer them from an experience of twelve years in the State, as well as to consider other points that present themselves to the minds of the dwellers by the rivers, lakes, and the sea, in the Eastern States, to whom agriculture has been a life-long pursuit, and who, having become weary of its routine in the East think of, and seek for, a new home in the broad and boundless West, with their eyes more especially turned toward Colorado.

As compared with Illinois, Minnesota, Nebraska, or Kansas, Colorado is not a farming country. The breadth of land suitable for cultivation is limited, and the conditions of the climate peculiar. As, in the days when the Boys in Blue met the Boys in Gray upon the battle-field, there was a "dead line," passing which meant danger and death, so in the agricultural field of Colorado, there is a "water line," to go beyond which means disappointment and destruction to the stalwart sons of the soil who seek to gain a livelihood from the bosom of Mother Earth. Inside the line, certain conditions being complied with, success is certain.

As a late writer upon the subject has tersely put it, "Agriculture in Colorado is an entirely different pursuit from what it is in the Eastern States, and the farmer who comes to the State and enters upon the cultivation of the soil in the style he has been accustomed to, will find that failure is more likely to result from his labors than success. He has so much to unlearn. It is better to abandon all notions and begin anew. Dependent upon irrigation for the growth of his crops, he must study the methods and meet the requirements of the climate. With a fixed purpose in his mind to overcome all the obstacles that will daily present themselves to him, it will not be long before the new order of things will be familiar to him. Once understanding the method, he may rely upon Nature for the rest. Bountiful harvests will crown his efforts, and excellent prices will cheer his heart and fill his pocket. Irrigation is dreaded, because it is not understood; yet the records of ancient history are full of it, and to day, in India, China, Italy, Spain, France, and other countries, long and expensively-maintained canals are the reliance of millions, to whom a failure of the water would literally mean starvation."

Colorado, then, is not a farming country, in the sense that Kansas is. But farming can be done in Colorado, and money made at it. The danger of an over-supply of production, so far as the cereals, fruits, and vegetables are concerned, is not among the possibilities of the future. Yearly over ten million dollars' worth of agricultural products are shipped into the State. The land that lies where water can overrun it and permeate it, is valuable land, and will at no far-distant day bring prices that would now seem wild and extravagant to name.

But those who come must not expect more from Colorado than she can give. No doubt, hundreds of those who enter its borders, return to the States disappointed in their expectations, and lay heavy blame upon those who have written about its agricultural resources, and invited them to come. Those who reach Colorado with certain ideas of society, soil, climate, and country, based upon what they have left behind them, are likely to be disappointed, as they would be were they to go to Alaska. Those who come expecting to find fenced farms and plowed lands with fruit-bearing trees thereon, and irrigating canals intersecting every other rod of such lands, upon which they have only to file a "preëmption," or "homestead" claim, and then settle down and enjoy all the comforts of life, consequent upon an old social civilization, will have only themselves to blame for their disappointment. Such "soft spots" may be found, it is true; but they must be bought and paid for at a price a little higher, at least, than the Government asks for wild lands. Just as those who now purchase in the Wyoming Valley in Pennsylvania, or the Genesee Valley in New York, buy and pay for land that was once an unbroken forest, but from which hardy pioneers felled the trees, dragged the stumps, and braved peril from wild beasts, and from still wilder savages. It took one man many years to clear a farm in Indiana, and in Colorado the conditions of success vary only in peculiarity. One man alone cannot build an irrigating canal many miles in length, and so redeem broad prairie land from the curse of sterility. Seldom can ten men do it, save where the land lies close to the water's edge. It takes combined energy, skill, and capital to construct them. Once built, however, and the land cultivated, the harvest is sure for the farmer who sows his seed, and, without watching the clouds, provides his land with the moisture it needs during the season of crop-growing.

Agriculture in Colorado and the valley lands being inseparable, they must be taken together in considering the amount of land available for cultivation, and locations where land can yet be obtained. Later, in this volume, I will describe these valleys in detail. In the present chapter the principal ones will be briefly mentioned, in order that the reader may have a general idea of the State as a whole, before descending to particular localities.

Beginning, therefore, in the northern part of the State, the first valley below the State line is the Cache-la-Poudre, one of the earliest settled and best farming valleys in the State. Here was located the Union Colony at Greeley, and the Agricultural Colony at Fort Collins. A number of large canals traverse a stretch of land about thirty-five miles long, having an average width of five miles. These are mainly on the north side of the stream. As this valley has had the benefit of new settlers for many years, homestead locations are very scarce. Parties having means, however, will find it easy to secure pleasant farms, either in the neighborhood of Greeley, Eaton, Wheatlands, or Fort Collins. About one-third of the wheat at present raised in the State comes from this valley.

Lying seventeen miles south is the Big Thompson Valley, noted for its beauty and the fertility of its soil; though, indeed, it may be said that this last feature is peculiar to all the valleys of Colorado. An occasional homestead may be secured here, but as a rule, all the available land has long been filed upon, occupied, and patented. The Little Thompson, a tributary stream, has a small valley with choice arable land on either side fully occupied by settlers.

The St. Vrain Valley is thickly settled. It is one of the oldest districts in the State, dating back to the time when the country was only inhabited by trappers. If a new comer desires a home among a community as prosperous as any in the State, he can find it here. It has been said that there are more fenced, and consequently properly improved farms here, than elsewhere. Probably fifty thousand acres are under fence; improvements are of a good, permanent character. On both sides of the stream, look where you will, you find evidence of an intention to stay and make homes as well as farms. It will be readily understood, from this fact, that Government lands are not to be looked for here. But improved farms can be had at prices running from fifteen dollars to fifty dollars per acre. Owing to the fact that the supply of water from this stream is used to its utmost capacity, not many new farms, if indeed any, can be opened up, and these only under canals now in operation.

Boulder Valley is a famous wheat-growing section. The stream affords a fair supply of water, which at present is not all used for irrigating purposes. All the arable land, however, is held by private parties. About twenty thousand acres are under fence. Considerable hay is raised.

In Ralston, Bear, and Clear Creek Valleys, in the near vicinity of the City of Denver, there is but little vacant land. The supply of water, unless it may be from the last named stream, is used to its utmost limit, and the opportunities, therefore, are few, where vacant land invites the new comer to establish a home upon it.

The South Platte Valley, for fifty miles from where it debouches from the foot-hills, is occupied by farmers on the lands lying contiguous to the stream. Until lately the canals from it were small and suited, save in the neighborhood of the towns of Littleton, Brighton, Platteville and Evans, to the needs of individual farmers along its banks. But there is now in course of construction, a canal whose proposed dimensions make it the largest enterprise of the kind in the State, which will bring many thousand acres of land under cultivation within ten miles of the largest city—Denver—in the State; and furnish homes for thousands of farmers. An area, of probably one hundred thousand acres can be put into cultivation, and the next few years will demonstrate the value of every foot of land under this canal, of which a fuller account will be given in the chapter devoted to the South Platte Valley.

On the Divide, as it is called, irrigation is not always required to raise crops. Here is a section of country eminently adapted to dairying. The altitude is from six thousand to seven thousand five hundred feet above the level of the sea. Timber abounds. Springs give clear, pure, cold water in abundance, while rain enough falls, in ordinary seasons, to insure crops of grain and potatoes. This belt of country in Central Colorado is not so well known as some other sections, save for its timber. It has been somewhat inaccessible, but a railroad crosses it on its western limit, and a second is now traversing it on its eastern line. It has no large streams. Its climate may be called peculiar. It is famous for the sharpest lightning known in the State. But it has advantages that may well attract the attention of new comers.

On the Fontaine-qui-Bouille but little unoccupied land can be found. The supply of water available for irrigation is not large; probably ten thousand acres can be cultivated. There are a good many farms between Colorado Springs and Pueblo that lie idle, but should be in the hands of enterprising men. There is no doubt that lands can be purchased at reasonable figures and on easy terms, and it will not be time lost for intending settlers, as they journey southward, to look over these neglected places.

In the Arkansas Valley lie vast stretches of arable land, reaching from the foot-hills to the easternmost limit of the State. Not one twentieth part has as yet been put under cultivation. The Atchison, Topeka and Santa Fé railroad runs through nearly the entire belt, thus making Eastern and Western markets convenient of access. The soil is somewhat more sandy than the soil in the northern part of the State, and does not, therefore, hold the water as well, requiring more for the season's use. There are a number of streams tributary to the Arkansas, whose valleys are more or less suitable for irrigation. In fact, taking this stream and the tributaries, and calculating the irrigable area, upon the assumption that twelve cubic feet of water per second will irrigate one square mile, or six hundred and forty acres, there is in this valley and its feeders at least half a million acres of land adapted to cultivation, the greatest portion of which lies open to settlement or purchase. In the early days of Colorado's history, the stream of emigration flowed up the valley of the South Platte, and for many years Northern Colorado received the benefit of settlement and Southern Colorado was overlooked. A milder climate, a sandier soil, a longer growing season, these are points in favor of this section of Colorado that may well invite the scrutiny of those who expect to settle in the State.

Lying west of these tributaries of the Arkansas, and beyond the Sangre de Christo range of mountains, is San Luis Park, watered by the Rio Grande del Norte and its feeders, the Alamosa, Conejos, Trinchara, La Jara, Culebra, Costilla, and other streams. Here there is an immense body of land, nearly all susceptible of cultivation, and very little of it occupied. There are entire townships of vacant agricultural lands open to homestead or preëmption, to lease or purchase from State, College and School authorities. Here is a section of country—of which I shall write more fully in a later chapter—fifty miles wide and two hundred long, in close proximity to mining regions where towns are rapidly springing up and whose inhabitants all require to be fed. A market that can never be overstocked here awaits the fortunate farmers who seek from the soil the abundant harvest that awaits those who sow the seed and who do not seek in vain. "Heretofore," says a late writer, "the agricultural resources of San Luis Park have been overlooked or neglected, but its producing capacities are practically inexhaustible. The arable lands are capable of supporting an immense population." I feel confident that the day is not far distant when the San Luis Park will be as closely settled as is the St. Vrain Valley now, with farmers as forehanded, with farms as well improved, with homes as firmly established. The Denver and Rio Grande railway system has touched the heart of the Park; moving southward, it traverses Conejos Valley; and, westward, the heart of the great San Juan country. Hence transportation to this desirable section of Colorado is easy and rapid.

Beyond the main range of mountains, and upon the western slope, there are points where areas of arable land, of varying size, are to be found. Especially in the section until lately known as the Indian Reservation, in Southwestern Colorado, there are magnificent belts of land suitable for cultivation, lately opened for settlement. Especially is this true of the Uncompahgre, Gunnison and Grand Valleys. On Bear, White, and Yampah rivers are localities yet to be occupied by thrifty farmers.

To the farmer who can reach Colorado with some capital, and is therefore in a position to select his home, there are abundant opportunities in Northern Colorado for so doing. The days of pioneering are over in the valleys of the Cache-la-Poudre, the St. Vrain and the Boulder. Improved farms, cultivated homes abound. The man who comes with money can easily find the man who is willing to sell his farm for money. To the farmer who comes with but little money, there are occasional opportunities in Northern Colorado, and abundant ones in the southern and western part of the State, to secure farms partly improved. Time, patience, and earnest labor are sure to bring about a state of affairs satisfactory to those engaged in a profession as honorable as it is ancient.

The valley lands of Colorado are as valuable and as exhaustless in treasure as are its hills. In each sleeps the princess awaiting the coming of the one whose touch shall waken her to life and activity. In the hills, the pick; in the valleys, the plow. Whether in glittering gold or in shimmering, shining grain, what matters it, so that happiness waits upon her waking?

CHAPTER II.

HISTORICAL AND GEOGRAPHICAL.

As early as 1530, Spanish adventurers in Mexico were interested in the accounts occasionally received from the north, of a land full of gold and precious stones. Their cupidity being naturally excited, led to various partial but unsatisfactory explorations, with a view to the establishment of the Catholic religion, and securing the untold wealth supposed to be hidden in what was termed the Buffalo country, or what is now known as Arizona, New Mexico, and Colorado.

In the year 1540, Vasques Coronada, a Spanish adventurer, fitted out, under the direction of the Viceroy of the Spanish Crown at Sinaloa, in New Spain, an expedition whose passage along the base of the Rocky Mountains is the first upon record. He passed up the canons leading to the source of the Gila River, crossed the mountains, and reaching the Rio Grande del Norte, followed up this stream until he entered San Luis Park. Finding his way out of this magnificent valley through the pass called Sangre de Christo, he turned his steps northward and skirted the base of the mountains until he reached Long's Peak, in the northern part of the State.

Coronada sought for gold, but found it not. The country of the Seven Cities of Cibola, of which so much had been heard, was a disappointment to him wherever he went, inasmuch as he found no evidence of wealth, and only a few scattered settlements of Indians, where he supposed were populous cities. But the ruins he met with were remarkable, and to this day, the archæologists are puzzled over the story they conceal. But Coronada made no settlement, though he traversed the base of the mountains, pierced the deep canons, and heard the wind whistle among the trees on the mountain tops. He sought for gold and found it not; yet probably passed over the richest deposits of gold and silver in the world. The wand of witch-hazel had lost its power, or, perchance, the hour had not yet struck when the veins of the heart of the Continent were to be opened, yielding such wonderful treasures to the world. Long years passed before anything more was known of the hidden land.

In the seventeenth century, various bold explorers visited the vast region of country lying north of the Rio Grand del Norte. Col. Wood in 1654, Capt. Bolt in 1670, and M. de la Salle in 1682. During this period the country was supposed to be under French rule, but in 1769 it was ceded to Spain, under whose control it remained thirty years, when it again passed into the hands of the French. Three years later, the United States, by purchase and by treaty, came into possession, and from the opening of the nineteenth century, the story of this vast region is part and parcel of American history.

Major Zebulon N. Pike's is the first expedition in date, having been fitted out under the direction of the War Department as early as 1805. His main object of search was the source of the Arkansas. On the 15th of November, of that year, he came in sight of what had before been called Mexican Mountain, now known as Pike's Peak; on the 25th he camped at its base. One or two efforts were made to ascend it, but failure ensued on account of the immense fields of snow upon its rugged sides. Returning to the plains, he crossed the Divide between the Arkansas and the South Platte, and traversed the country until he came to what was supposed to be the Red River; but it is the opinion of Fremont and others that the stream he reached was the Grand, in the western part of Colorado.

In 1819, Col. Long's expedition set out from Pittsburgh, and, striking the mountains near Fort St. Vrain, on the stream of that name, he caught his first view of the peak named in his honor. He traversed the base of the mountains through the entire length of the territory, and it was during this expedition that Dr. James ascended the Mexican Mountain, or Grand Peak, first seen by Major Pike. Col. Long named it after the bold explorer who first scaled its rock-ribbed sides, but later it was found that Pike's name had been fastened to it by the settlers in a way that could not be shaken off.

Bonneville followed Long in 1832, and ten years later Col. Fremont's expedition was sent out. Two years later it returned, having passed up the South Platte, crossed the Big Thompson, Cache-la-Poudre and Crow creeks, thence along the base of the foot-hills to Fort Laramie (then a part of the American Fur Company), and so across the range to the Pacific Coast. After exploring north and south, he recrossed the range and made his way through what is now known as South Park, to the Arkansas River.

The printed results of these three expeditions gave to the American people but a faint conception of the magnificent heritage they had fallen heir to. Up to this time there were but few white settlers in the country. The Pawnee and the Cheyenne, the Ute and the Arapahoe roamed over the country and made war upon each other for the possession of the valuable hunting grounds, and the wings of the Eagle of Civilization were dipped, at their western tips, in the sluggish waters of the Missouri River. All beyond, east of the Rocky range, was given over to a few adventurous trappers in the employ of fur companies and to the inhospitable savage.

In 1857, a party of Cherokee Indians on their way to

California, discovered gold in the sands of Ralston creek, an affluent of the South Platte River, and from this date the history of Colorado may fairly commence. The news spread like wild-fire and thousands rushed to the new El Dorado. By the year 1859, Pike's Peak was the objective point of the multitude of gold seekers, and the territory soon became a bee-hive. Colorado City, Denver, Black Hawk, Golden, and Georgetown were founded, and a Convention was called to form a State Constitution and to apply for admission into the Union. Submitted to the people, the proposition was rejected by a vote of two thousand one hundred to six hundred and fifty. In 1861, Congress organized the Territory of Colorado with its present boundaries. The population at this time was about thirty thousand—one-sixth of whom were females. In 1863, a second Convention met in Denver, formed a Constitution and submitted it to the people. This was also rejected, but the following year another attempt was made, which succeeded. A State organization was effected, a Governor, Legislature, Judicial Officers, Senators, and a Representative elected. The bill for admission as a State passed Congress with but little opposition, but President Johnson vetoed it. For ten years thereafter but little agitation of the State question occurred; but in 1875, an enabling act was again brought before Congress, and the people were called upon to choose members of a convention which was to draft a Constitution to be submitted to the people for adoption. This Convention met in December, 1875, closed its labors in March, 1876, having perfected a Constitution which was submitted to and adopted by the people, and the Centennial Year witnessed the entrance into the family of the Union, of Colorado, the Centennial State.

The geographical position of Colorado can be briefly stated. It comprises all that portion of the National domain within the thirty-seventh and forty-first parallels of north latitude, and the one hundred and second and one hundred and ninth meridian of west longitude. It is nearly square, and contains one hundred and six thousand four hundred and seventy-five square miles, or nearly sixty-eight millions of acres. Two-thirds of this vast region is one continuous system of mountain ranges, within whose gigantic arms lie enfolded valleys of unrivalled beauty and parks of magnificent extent. Here is to be found the most elevated region on the North American Continent. Mount Lincoln—like Saul of old among his brethren—towers three thousand feet above a score of fellow peaks lying north and south of its eternal snow-capped summit, and yet whose lowest altitude is twelve thousand feet above the level of the sea. From its summit can be seen twenty-five peaks over fourteen thousand feet high, and two hundred over twelve thousand, with lesser peaks, ranging from eight to ten thousand, almost innumerable. Professor Hayden fixed the position of every leading peak within thirty thousand square miles, in his survey, completed in 1873, and he characterized the ground as "one of the most interesting areas on the Continent, both in a geological and geographical point of view, forming, as it does, the center of the greatest elevation in the Rocky Mountain chain." In Central Colorado this chain proper is about one hundred and twenty miles broad, made up of three lofty parallel ranges, flanked on the western slope by great plateaus and groups of peaks. The front, or Colorado range, rises abruptly from the plains and can be seen in one grand panorama one hundred and forty miles long. Between these ranges lie the parks of Colorado, one of the most magnificent as well as most interesting features within the borders of the State. These parks are numerous, but there are four worthy of distinct mention. North Park, thirty miles in diameter, near the northern boundary, out of which flows the North Platte river, whose waters, following tortuous windings, reach the Missouri and Mississippi rivers, and finally rest in the placid bosom of the Gulf of Mexico. Middle Park, also a circular basin, is fifty miles in diameter. Out of it flows that Grand river which Pike reached and mistook for the Red River of the North, of which he was in search. South Park, thirty miles wide and sixty miles long, is one vast meadow through which the South Platte River courses. San Luis Park, most southerly of all, is drained by the Rio Grande del Norte. With elevations varying from six to eight thousand feet, well watered and abundantly timbered, an unequalled climate, with mineral springs and the precious metals in abundance, these parks are to be the habitation of thousands, and the seat of numberless industries. They are now (except the last-named) the paradise of the hunter, and for a few years to come will be the yearly resort of the Nimrods of the woods.

From the foot-hills to the timber line, the vast mountain chains traversing the State are one vast forest of pine and cedar, from which the future lumber and fuel of the inhabitants can be drawn for a century to come. In the heart of the mountains lie countless mines of gold, silver, iron, and coal, yet untouched. Mining is but in its infancy, though the State has leaped to the front rank of mineral-producing States. The seventy-five or hundred millions that have thus far dropped through the fingers of the miners, are but as a trifle to what shall come hereafter, when capital shall stiffen into strength and toughness, the hands that as yet grope feebly upon the surface of the shining soil. Beneath the tread of the sturdy prospector, lie minerals and precious stones without number, moss agates, onyx, amethyst, jasper, chalcedony and garnet; these and others hide themselves in the parks, beside the creeks, and in the foot-hills.

There was a time when the stones that lay scattered over the undulating plains of Mesopotamia were eloquent with the silence and the secrets of untold centuries. But one day, says a writer, there came an interpreter and the silence of the sands and the secret of the stones was a secret no longer. Nineveh, in all the grandeur of its desolation, stood revealed to the world to which it had become almost a tradition. The stones told their story as other stones have told theirs, from the time Jacob used one for a pillow, down to these later days when the geologist, with hammer in hand, goes about the earth, opening up at his touch new pages in the Book of Nature, recalling old truths from forgotten rolls of science, advancing human knowledge to higher planes, teaching new truths that brush away at once the cobwebs that ignorance and superstition have gathered about the ears, and eyes, and intellect of human kind.

So is it with the rocks and stones of Colorado. Already they begin to tell wonderful stories of the uncounted eons that stretch out into the limitless past of which we, as yet, only catch faint glimpses. Here is a field for the geologist, ever fresh and fair. The age is ripe for the revelation the geologic translator can give. These river beds, these parks where once swept inland seas, these foot-hills, these plains, each yield up distinctive specimens, marking the earth's wonderful progress from the Azoic age down to our own day.

The foot-hills, as they are called, to distinguish them from the higher ranges that tower west of them, are in reality mountain chains, only of lesser magnitude. They commence when the plains have reached an altitude of between four and five thousand feet above the level of the sea, and running parallel with the main ranges back of them, lift their heads from three to five thousand feet high. Here flourish the pine, cedar, aspen, and birch. In the valleys, and small parks they inclose, vegetation is very thrifty. The hay-producing qualities of the soil in these parks is simply wonderful. In some of them the tourist sinks knee deep in grass that has flourished and faded, grown and perished, season after season, until the surface, for miles, is one vast treacherous morass of decayed vegetation, into which it is almost impossible to venture with safety.

These, and there are thousands of such places scattered through the mountain region of Colorado, are to be the herdsmen's and dairymen's Eden of the future. Here, sheltered from the storms and the winds of the hills, that surround them, they can grow, without irrigation, abundant harvests of barley and potatoes. Here their sheep and cattle can have prolific pasturage, and the towns springing up along the lines of new railroads, and the mining interests that are so rapidly developing, will demand from them, and from the farmers on the slopes lying eastward toward the prairies, all that they can produce, paying a dividend that would startle the farmer, sheepmen and dairymen of the East, into the belief that Colorado and El Dorado were one.

CHAPTER III.

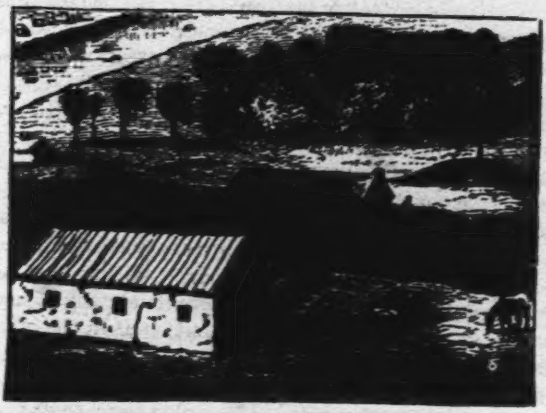
COLONIZATION IN COLORADO.

When Cecrops landed on the shores of Greece to found his colony, did his followers receive favorable impressions? When the Mayflower band stood upon the sterile Plymouth shores, did the surroundings cheer and encourage the pilgrims? Ambitious hopes in the one case, and religious zeal in the other, aided each to bear up under the unfavorable and unpropitious circumstances, and to look beyond the hour, with its temporary difficulties, dangers and disappointments, to the dawning of a happier day. Through faith Cecrops beheld the Athens of the future rising out of the sands that shone upon the sea shore. Through like faith the little band of Pilgrims beheld a happy, prosperous, exalted nation rising in strength and grandeur within one hundred years from the day their feet were wet with the salt spray of the Atlantic Ocean. Could they have foreseen what a still later one hundred years would accomplish, what a glimpse of worldly glory and renown would have shone like an aureole around their perplexed pathway.

And as it was in the ancient and modern time, so it is now. First impressions are seldom favorable to a pioneer. The surroundings of the new place are so different, that it is impossible, almost, to resist comparing the present with the past; and herein lies the chief cause of failure with those who have returned from the West to the East with such discouraging stories of the trials that beset them. It is true, there are trials. It is true, there are difficulties. It is true, there are times when even the stout heart grows weak and the strong will becomes yielding, and the floodgates of memory swing open, letting through a surging, sweeping tide of dear delights of days gone by, to unnerve the man and the woman otherwise brave and strong to struggle through the battle of life. Yet the law of compensation rules here as elsewhere; in this as in other things. Though some shining links in the chain have disappeared, others full as bright and fair take their place, and the chain is stronger for the change. "Something beautiful has vanished," the pioneer thinks, as, sitting under bare, brown rafters and upon uncarpeted floors, he recalls the surroundings of the home he left behind him.

The pioneer who, not many scores of years ago, sought on the shores of the inland lakes, or along the majestic Alleghanies, or amid the dark and bloody ground of Kentucky for a new home, had in him all the elements that made Cecrops a hero, or the name of Columbus one of "the few immortal names that were not born to die." For it needed a brave heart and a stout arm to drive stakes beyond the frontier line—stakes that became an instant challenge to the Indian and the wild beast for the supremacy of the forest, and a sign that the waves of civilization had advanced so many paces further into the wilderness. Think you first impressions were favorable? Nature in her solitude puts on her gloomiest mood. The trees, even, hide the sunshine that might gladden the hearts of young and old, could it but fall lightly upon their faces. The day brings toil and the night brings pain. The season, perhaps, is short, and the work of preparation for the inclemency of the coming winter months is arduous. The burden is heavy and grievous to be borne. Yet, what a grand lesson of self-reliance this pioneering offers to the world. Given the time, an acorn becomes an oak. So nations grow. Through such influences as these our country has enlarged its borders until the wings of its eagle dip, one in the turbulent, and one in the placid waves of the two mighty oceans.

But these latter days have wrought a change; the pioneer no longer goes forth to fight his battle alone. He becomes a colonist and joins with a score or an hundred others. They go forth with strong arms and brave hearts upon their mission to reclaim the waste lands, and to render fruitful the barren bosom of the earth. Yet is the work no less hard, the outlook at first no less discouraging. The impressions made upon the mind at first are unfavorable, from the very circumstances of the case, and because the human mind cannot resist the impulse which leads it to compare the present with the past—an impulse all the more strong because here the shadows of the present show in stronger light the sunshine of the past, and bring into broader relief and more vivid outline—



AN EARLY SETTLER'S RANCHE—1870.

> "The tender grace of a day that is dead,"

a grace that will never return. Never? Is this true? The rose that has bloomed can never again unfold its blushing petals to the sunshine and the breeze; but the bush from whence it bloomed, through whose sap it drew the elements of beauty—is that dead? Nay, nay! Next year, stronger, better fitted for its work, it reproduces the roses of the day that was dead, and fairer blooms and tenderer graces come to take the place of the old, the faded and the forgotten.

As I think it over, the memory of a dear old home far away on the eastern coast comes into my mind. I see the roses that bloomed by the porch, the morning glories and the hollyhocks that revelled in the bright sunshine, the stately trees that cast their refreshing shade over the lawn on which violets hid their sweet blue faces. I hear childish prattle, sweet womanly voices, honest manly tones. The faces and the forms of those I loved pass by as in a vision.

Years ago, De Tocqueville penned this sentence: "The gradual but continuous progress of the races towards the Rocky Mountains has all the solemnity of a Providential event. It is like a deluge of men rising unabatedly and moving onward by the hand of God." Within the last few years, this progress has been more than gradual, now that the method of settling the vacant lands in the West through systematic colonization may be set down with definite precision as the most rapid, while at the same time the most healthy way. The little colony company, having learned from the bees the lesson of swarming, gather about their chosen leader, and at once, in what was the heart of the wilderness, appear the signs of a populous community. It is like the kiss of the Prince upon the lips of the Princess, asleep for a hundred years in the palace hidden in the woods. The hammer rings, and the anvil clinks; the monotonous music of the saw sounds on the air; the virgin sod, upturned to the sunlight, is kissed by the sun as it was never kissed before, and the full fruition of the farmer's hopes follows in due season. Ere long the sound of the church bell invites the people to prayer; the clatter of the mill wheel is heard; the school house rears its stately proportions in the air; the telegraph concentrates the arteries that communicate with the ends of the earth; the railway brings the products of the four quarters of the globe to the hearths of the people. Soon, where, one brief year preceding, solitude reigned supreme, a city stands in all the fresh vigor of its youth. The people, prosperous in all their undertakings, move through the streets. The age has advanced by so much as these peoples have been gotten out of the old grooves of action, and, set into the new ones, have moved forward on broader gauges, to a later and more successful civilization.

Think you, dear reader, that my picture is overdrawn? Let me take one instance out of three in my own personal experience of colonization in Colorado.

The town of Greeley, in Weld county, Colorado, was settled in April, 1870, under the auspices of what was called the Union Colony, called together through the New York "Tribune." It is therefore a fair type of the new civilization that is fast converting the vast domains of the West into prosperous towns and thriving villages. I well remember the strange thrill of satisfaction I experienced, when telegraphic announcement was made that a site had been chosen, lands selected, a home founded for those who had cast their lot together in the well nigh Quixotic scheme of founding a town in the Far West. For this was the pioneer of the new system of settlement. Two thousand miles away. Why, the distance itself was a damper upon enthusiasm. Why not in South America, Alaska, China, or the Islands of the Sea? Why in Colorado? The name itself was an augury. God's Country it has been, and still is, called. So we came from the bays of Maine and the capes of Florida, from the forests of Minnesota and the swamps of Louisiana, from the shores of the great inland lakes and from the pavements of the multitude burdened cities; strangers and yet friends; kindred through a common hope, a common faith, a common purpose. And we pitched our tents in the bright day shine, and the soft, sweet starlight of that eventful summer on the banks of the fair flowing river, by whose side we were to receive a blessing or a ban.

The record of the times in which the faith of manhood and the trust of womanhood were tried, has never fairly been put upon paper, and never can be. Doubts chased each other through our minds as the fleet antelope chased its fellow across the broad prairies. Fears came with the morning sunbeams, and were not dispelled when the shadows of the night fell down upon us. But the hopes that had cheered our hearts through the long journey westward, never wholly died out. There were to be gains as well as losses. There were to be pleasures as well as pains. The tender bosom of Mother Earth gave out suggestions of the mighty forces concealed within, bidding us bend the witch-hazel rod of an indomitable will, and the hidden treasure should be found.

Can the reader imagine the situation? The chosen ground was unbroken for miles, and the winds of unnumbered centuries had blown off the light soil, leaving a coat of gravel over the surface not covered by grass, or cactus. This grass was short and brown, and presented to the eye no evidence of nutritive qualities, while the cactus did not then wear the variegated blossoms that make it attractive to the eye, while its prickly armor in no way commended it to the touch.

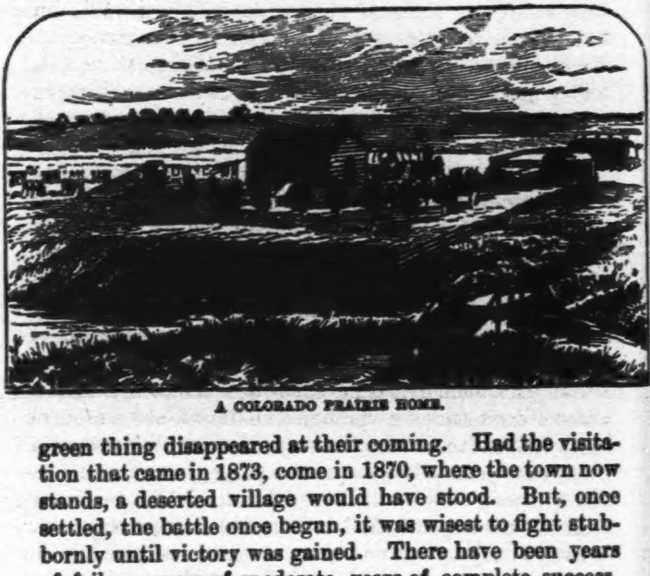
There were days when from fifty to one hundred persons arrived, hardly any bringing with them provisions, tents, blankets, or any of the necessaries of life. They could barely protect themselves from the cold winds, or the still colder night air. No canals had been dug, no water was running, and in all the town there was but one well.

Those were dark days for colonization in Colorado. Some there were who seemed to forget that it was the work of the colony to create a city, who expected to see one already built, with houses and stores, mills and factories, schools and churches,—in fact, all the adjuncts of a settled civilization. Disappointment set their teeth upon edge, and kindled bitter feelings of animosity in their hearts. Tongues wagged, not wisely or well. Men had come to colonize, but not waiting to investigate, to examine the location, to test the capabilities of the soil, they remained to curse only so long as the next train east delayed its going. Then, shaking the dust of Greeley from their feet, they "went to their own place."

Time passed. A survey was soon completed. Locations were chosen by those who, having ventured so far, had sufficient foresight to see that the experiment was but at its beginning, and that success lay in the near future. The top of the ladder was not to be reached by one bound, even in Colorado. One by one the rungs were to be trodden, and by feet made weary on the upward way.

But soon an irrigating canal was completed, and the water came dancing through the flumes like a ministering angel (as indeed it was), scattering blessings all along its path. It ran over the parched land, and blade and blossom awoke to a new beauty. The birds sang their welcome, early and late, to the new comers, whom destiny had brought to these so lately desolate, but now blooming prairie lands. Trees were planted. Active, earnest, true-hearted men and women set themselves to work with a spirit that deserved and achieved success. The cloud passed away—the sunshine took its place, and thenceforward cheered, warmed, and lighted the hearts of all.

Twelve years have passed away. Not twelve years of perfect success, for continually men find that there are obstacles and difficulties in their path, and that it is their mission to conquer them. And lo! after constructing a canal twenty feet wide and thirty miles long, capable of watering sixty thousand acres of land, the farmers found that they had an enemy to contend with they little expected, when settlement was first made. The grasshoppers came down "like a wolf on the fold," and every green thing disappeared at their coming. Had the visitation that came in 1873, come in 1870, where the town now stands, a deserted village would have stood. But, once settled, the battle once begun, it was wisest to fight stubbornly until victory was gained. There have been years of failure, years of moderate, years of complete success. To-day there is a town of two thousand inhabitants, a large and prosperous farming community tributary to it, and the wealth of the State increased by millions. All the results of colonization. Three hundred thousand bushels of wheat were grown there last year.



A COLORADO PRAIRIE HOME.

And what has been done at Greeley, has been done elsewhere, in a greater or less degree. In the years that followed, appeared Colorado Springs, Evans, Fort Collins, Longmont, Platteville, and other colony towns, and there is room for a score more now that the narrow-gauge railway, the Denver and Rio Grande, has pierced the forbidding mountain passes, and entered the hearts of the great peaks and still greater valleys beyond the range. Here are opportunities for new colonies, greater than those in the past. Little clusters, or large companies of families, can gather together the lares and penates of the old home, and set them down on the altars of the new home, under the shadow of the mighty mountains in the gold and silver rock-ribbed heart of the Centennial State.

The Valley of the Nile, for untold ages, supported a population of nearly eight millions. From the heights of Syene to the shores of the Mediterranean Sea it was once renowned for its fertility. The staple commodity, of course, was grain, the supply of which was so abundant that Syria and Arabia drew their supplies from it. The valley was cultivated, by irrigation, for three thousand years, and is still capable of furnishing millions with food. In Colorado there are hundreds of valleys equally adapted by nature for the same cultivation as was given by irrigation to the ancient valley, and millions of men and women can be supported by the product of the soil. Every square mile of land in Colorado is capable of producing twelve thousand eight hundred bushels of wheat, capable of supporting one hundred and seventy people on the basis of four hundred and fifty pounds of food per annum required for each adult.

The pioneer system has had its day. The colony system takes its place. When the new and the old meet face to face, the new conquers. It was so when Paul, bearing in his hand the budding branches of the new

Christianity, met Nero, the young-old Emperor (young in years, old in vice), the fruit of the effete Roman civilization, and by his earnest gaze and sincere speech, shivered the scepter with which Rome had so long ruled the world. It is so now when the new colonial civilization meets the old pioneer system, and sweeps away, on the instant, the long years of loneliness and solitary existence that were wont to intervene before the wave of civilized life reached the little community that had fastened its feeble life in the loneliness of the woods, the silence of the prairies, the solitary grandeur of the mountain ranges of the West.

CHAPTER IV.

IRRIGATION.—MEASUREMENT OF WATER.

To write about Colorado agriculture and say nothing concerning irrigation, would be like enacting the play of Hamlet, leaving out the principal character therein. Yet the subject is one in which those principally interested have advanced only as far as the A B C of knowledge is concerned. Irrigation is as old, almost, as the world itself. In an article contributed to a Southern journal a year or two ago, Professor Whitney, of Florida, after referring to the practice of irrigation in Egypt, and to various scriptural allusions, showing that it was also practised by the Israelites, says that from reliable profane writers we learn that this branch of agriculture was practised by the Romans long before the Christian Era. Virgil refers to it in his celebrated work on husbandry, the Georgics. The Chinese claim to have been familiar with it before the flood. Even the aborigines of the so-called New World were not ignorant of the system. The skill and civilization of the Aztecs, as displayed in their wondrously beautiful gardens, their immense reservoirs and extensive aqueducts, are noted by Prescott and other historiographers of the Spanish Conquest. "These relics of a long past age, found in every warm country, are enduring monuments of a progressive civilization, compared with which desolate fields and crumbling cities, the sad mementoes of military renown, are as the patient and useful animals of domestic economy to the prowling beasts of prey, whose only province is to destroy."

As one reads of projected canals in Colorado, whose lengths are to reach to fifty miles or more, we are apt to think that their projectors are about to undertake something on an immense scale, which is to be the wonder of the world. Yet these canals will be puny compared with some that have been in operation for hundreds of years in Italy and elsewhere. The Ganges Canal, of India, is one thousand miles long, discharging eight thousand cubic feet of water per second. It has reclaimed from the desert eleven million acres, and put them under successful cultivation. We are told that "the great canal of the Ticino, in Italy, was constructed in the twelfth century, and for more than six hundred years has carried a volume of water equal to one thousand eight hundred cubic feet per second. This large mass of water is conducted through the country by thousands of different channels, fertilizing and stimulating the soil to such a remarkable degree, as to render the region through which it passes one of the most productive and densely populated in the world." The plains of Assyria and Babylon were once covered with canals. The irrigated lands of Spain amount to five hundred thousand acres. In France there are three hundred thousand acres under this beneficent system. In fact, the history of numberless nations, ancient and modern, is full of facts connected with this interesting topic.

In this new subject, then, which after all is so old, every citizen, present and prospective, of Colorado, has a deep and abiding interest. The future of agriculture depends upon it, and therefore much of the welfare and prosperity of the State hinges upon the establishment of a correct system of the division of the waters, the economic use of them, and their storage in reservoirs, natural and constructed, when not wanted for present use.

There are so many conflicting interests involved in this complex question, that it seems as though the State must eventually assume the control of the canal system, managing it for the best interests of all concerned, taxing each district according to the volume of water that is used, and for the expense of superintendence and repairs.

The exact number of canals belonging to corporate companies and to individuals in Colorado is unknown. The number will probably reach to one thousand, though not more than fifty are of any great size.

The question as to the amount of water required per acre, and if the land does not need less and less each year after it has been subjected to irrigation, has elicited a variety of opinions. It is said that land lying under the first canal built in Colorado, twenty-two years ago, requires as much water now as it did the first season. It seems to be the experience of farmers in and around Greeley, where they base their conclusions on twelve years of observation, that this is a fact. Yet in Utah the case seems to be established on the other side. Bishop Musser, of that Territory, in an address before the Irrigation Convention held in Denver in 1873, said: "When Salt Lake City was first founded, the water capacity for irrigating purposes did not exceed eight hundred or nine hundred acres. Now, between four thousand and five thousand acres are successfully irrigated. At first the land was arid and thirsty. Subsequent irrigation saturated and settled the soil, and thus slaked much of its early thirst. The increased rainfall—no doubt superinduced by agriculture, occupation and cultivation—and the numerous fruit and shade trees—like so many mulching agencies neutralized the drying effects of the sun's rays and of the prevailing winds—have very largely contributed to cool and moisten the soil, and to lessen the necessity of frequent and elaborate watering." Dr. E. E. Edwards, late President of the Colorado Agricultural College, in an address on the utility of trees, before a Farmers' Institute, held a year or two ago, in Denver, cited some later facts from Utah, bearing out the supposition that each year would require less water for irrigation. But it would seem as though—in the past ages—this important point was overlooked or not recognized, since we find no mention made of it in papers bearing upon irrigation in ancient times. The soil of Utah is not likely to be very different from that of Colorado. There is on record a statement of the character of the soil of over forty thousand acres under the various canals devoted to the cereals, vegetables, fruits, and in meadow, and the table stands as follows:

Black Loam	7,200	Acres.
Sandy Loam	3,800	"
Loam and Gravel	8,250	"
Loam and Clay	3,500	"
Loam and Alkali	1,200	"
Clay and Gravel	5,000	"
Clay and Plaster	3,500	"
Alkali, Iron, and Sand	2,500	"
Sand Alkali and Volcanic	1,000	"

Thus all kinds of soil are covered.

It is probable that the upper or bench lands require each year the same amount of water; but the lower lands, especially those classed as "bottom lands," verging on the streams themselves, receive all the water they need through percolation. In fact, thousands of acres of what were once the finest hay lands in the valleys are now nothing but swamp lands, the direct result of seepage from the large canals lying two or three miles above them on the bench lands. In these cases a thorough system of drainage, involving more or less of expense, must eventually be adopted, or the lands will be ruined.

Touching the cost of irrigation, the figures vary from the extremely low amount of ten cents per acre up to the high rate of sixteen dollars. Water generally rents for from one dollar to three dollars per acre annually, and, taking a fair average, may be set down at two dollars per acre. Where canals have been built on the colony, or coöperative plan, each land-holder having an interest in them, the cost per acre covers only superintendence and repairs, and does not reach over twenty-five cents per acre. But most of the canals are owned by corporations who rent the water at a fixed rate, and, in such cases, there is no lower rate than one dollar, while some charge three dollars. One inch of water per acre is the general allowance. Perpetual water rights under some canals, subject to assessment for repairs and superintendence, now have a valuation as high as one thousand two hundred and fifty dollars.

Concerning the affinity of water and soil, the following scientific explanation is from the pen of Dr. Parsons: "Without irrigation, this country (Colorado) would be comparatively worthless for agricultural purposes. Water being a universal solvent, sets free certain qualities in the earth which are taken up through it as a medium. The vegetable kingdom, like the animal, imbibes water, the former from within, the latter from without. The apparatus of the plant is its roots, leaves, and branches, for absorbing water, potassium, ammonia, and other chemical substances, which go so largely toward building it up. A plant, like a man, if it gets too much nutriment in the shape of water, or anything else, is ruined. Corn especially may very readily get too much water, and the result is small ears and a light crop. For corn and potatoes it is better to let the water run some distance from them, and then allow the fluid to percolate gradually to the growing substances. The quality of the soil in this connection must also be considered. The vegetable feeds upon the mineral. It has always been so. Formerly there was more carbonic acid gas in the atmosphere than now, and consequently plants developed rapidly. The absorption of this gas by the earth deprived the atmosphere of this excess of gas, and then came the era of animal life. This is not an alluvial country, like that of the Mississippi Valley. The soil is better than that. It gives greater nutriment to the cereals, and they in turn give more substance to people who consume the grain."

In considering the time for irrigation, it may be said, as a general rule, that early in the morning, or late in the afternoon and evening, are the best times. The bright and powerful sun, when shining upon the young and tender plants and growing grain, may have a deleterious influence when water is applied. This is not an assured fact, but very many entertain such a belief. When the grain is high enough to yield a shadow, then it does not so much matter. One thing is certain, in Egypt and India, the evening, the night, and the early morning were chosen as the best time for the flowing of water upon the crops. On clay soil slight and frequent irrigation is best. On sandy soil, the water can be run broadcast until the field is thoroughly flooded. Water in May germinates the seed, but does not act as a fertilizer of the soil to the extent that it does later; in June and July the sedimentary matter is running heavily, and the streams and canals are laden with fertilizing material which decreases as the streams lower in volume in the fall. The soil should not be kept in a continually moist condition on top, because its apparent dryness is no indication that there is not sufficient moisture below.

Mr. W. D. Arnett, one of the principal farmers on Bear Creek, beyond Denver, once said at a Farmers' Club meeting that farmers irrigated too little. If irrigation was practised after the crops were gathered, and at all times when convenient, it would only be providing crops with a more bountiful repast. A farmer in the St. Vrain Valley, writing to his home organ, also gives testimony in favor of fall irrigation; he irrigated his ground as thoroughly as though he had a crop growing upon it, and as soon as it became sufficiently dry, he started his plow, and stopped only when freezing ground compelled him to do so. It took but a short time to do this in the fall, and he regarded his gain as follows: First, plowing was done with less wear on team, plow, and patience. Second, earlier crops were put in, requiring less irrigation to mature them. Third, an earlier harvest, giving him the advantage of a high market. Fourth, fall irrigation increased his crop by adding fertility to the soil when there was no growing crop to absorb it. This last argument, while all seem good, is a new one not advanced before; if true, the knowledge is of inestimable value to farmers in Colorado, so many of whom are croppers year after year, returning nothing to the soil from which they take so much.

Early in 1873 Mr. Henry T. West, of Greeley, in an able communication to the "Tribune" of that place, called attention to this subject of fall plowing, advocating thoroughly wetting the ground during the fall and winter, and, if possible, plowing and wetting down again. Ground thus treated, he argued, would need but little water the following growing season. In proof of this he referred to a crop of wheat raised on sod ground (which generally requires more moisture than old land), that had been treated in the manner referred to, and had yielded over forty bushels of wheat to the acre, without irrigation during the season of growth. He added, "The true economist endeavors to make the most of what he has, and if our people can be shown that by using water properly, they can water thoroughly treble the number of acres they now saturate partly, and so increase their yield of crops from fifty to one hundred per cent, they ought, at least, to test the matter."

This seems to be the custom in Utah, where fall irrigation is practised to a great extent. There the flow is especially for grain, sowing as early in the spring as possible. In studying the methods by which the greatest amount of land can be brought under the water supply of the State, this point is one to be taken into consideration.

An observant writer in one of the valley papers of the State—the Sagauche "Chronicle"—gives a few practical hints worthy of being embodied in this chapter.

"In preparing the ground for planting, the aim should be to have it in such condition that the crop, when planted, will come up and make a good growth before the first irrigation is resorted to. If the ground is to be broken in the spring, and is not sufficiently moist to germinate the seeds, it should be irrigated before plowing, planting to follow as soon thereafter as possible. If the ground is in proper condition it should be dragged with a log, or rolled with a roller, after planting, to smooth and level the surface. It has been found that the ground dries out on such a surface to the depth of an inch, and that inch forms a non-conductor of moisture from below, and the soil thereby retains the moisture in it for a long time.

"As a rule, the longer the first application of water for irrigation can be put off, the better it will be for the crop. The evaporation of moisture from the soil is accomplished by capillary attraction. If the particles of soil are packed closely together, the evaporation of moisture is much more rapid than when the soil is loose. When it is loose and moist, the tender rootlets have the best opportunity for growth and expansion, and as the soil dries they strike downward, getting so far below the surface that the plant stands a drouth much better than one whose roots remain near the surface. When the ground has to be irrigated before the seed is up, the soil becomes packed, and dries out rapidly, and irrigation is oftener required. Once begun it must be kept up until the crop is about ripening."

There is more damage done to crops by too much irrigation than by too little. Much more water is used than would be necessary if the ground was properly prepared beforehand, and water applied intelligently afterwards. Hundreds of fields of grain have suffered from too much water early in the season where one has suffered from drouth.

The experience of many farmers who have failed, during a dry season, to get the water they contracted for, has shown this to be a fact.

It is thought by many that irrigation is a very expensive method; this belief, no doubt, keeps many farmers from settling in Colorado. But it is not true. On the contrary, it is rather an advantage to "hold the rain in the hollow of one's hand." It may add a little to the labor required to be performed upon an acre of land, but the increased yield more than repays this extra toil. The cultivation of crops being insured by the ability to apply the moisture just when it is needed, drouth is defied, and a harvest almost certain. The preparation of irrigating canals will not, on an average, exceed the expense of drainage required in rainy countries, while a dry country means dry air, health, clear skies, and good roadways. Wheat can be raised at an expense of fifty cents per bushel, or ten dollars per acre, taking the low average of twenty bushels as the yield, leaving a net profit of fourteen dollars per acre. Oats can be raised at an expense of ten dollars, and yield a profit not lower than wheat. Corn can be raised at a cost of seven dollars per acre, and return a profit of fourteen dollars. Potatoes average in expense twenty dollars, and in moderately good seasons return a profit of sixty dollars per acre. It will be seen that a good margin of profit lies in these figures, and while there may be seasons when excessive drouth, or untimely frost, or grasshopper visitations may curtail the harvest, yet these are less frequent than the storms, the drouth, and the insects that periodically visit the fields in the Eastern States.

The labor of irrigation is not so great as might be imagined. When once the laterals are built that conduct the main currents of water over the farm, it is not difficult to follow them up, using a spade to cut the bank here and there to allow the water to overflow into the growing grain. Flooding is pursued for grain, and running in furrows, where there are rows, as with corn, cane, potatoes, and vegetables. To describe the methods of irrigation would take up too much space. There are almost as many ways as there are farms. The lay of the land must be taken into consideration, and methods must be devised to suit circumstances. Yet one man can easily tend to the irrigation of eighty acres of wheat, or forty acres of potatoes. Some fortunate farmers are able, by a thorough system of laterals, with suitable flood-gates, to let the water into their fields toward night-fall, and go to bed feeling assured that in the morning they will find a large acreage well soaked with the precious fluid. But new comers will probably puzzle their heads over the problem. It is only by experience that an economical system of irrigation can be established on each farm. The contour of the land decides the cost. But, once arranged, with a little care, the bugbear of irrigation becomes a work of pleasure to those engaged in it. It is a study not easily learned. Once mastered, the man is master of the situation for all seasons.

For grain, two irrigations, in June and July, are generally sufficient. In some years, one suffices. For garden purposes, much more water is required, depending somewhat upon the character of the soil; if very sandy, more is required than where loam or clay predominates. In gardening it is not best to apply the water directly to the growing plant. The method pursued in Homer's time has come down to us, and is accepted as the best. Water is made to flow in furrows, reaching the roots by seepage.

MEASUREMENT OF WATER.

The measurement of water is one of the important questions that continually confront both the seller and the buyer of water for irrigation. To secure its equitable distribution is a problem commanding the attention of hydraulic engineers elsewhere, as well as in Colorado. In the report of the commissioners on the investigation of the San Joaquin, and other valleys in California, made to Congress a few years ago, we find it stated that water should only be sold by measure, and that the introduction of a system of selling water by the cubic foot would make it to the interest of the cultivator to use it economically. The difficulties attending this measurement, under different and ever varying heads, and through varying dimensions and shapes of outlets, have been many. They have been met here in Colorado, and there are few farmers who, using the inch measure under pressure, know how much water they get or use, though they know how much they pay for. The grade, the size of the orifice through which the water flows, the depth and breadth of the channel, all affect the result, more or less. There is no one rule that governs all the canals in Colorado. In Greeley one method prevails. In Longmont another, and so on, in various parts of the State.

In the early days when water was abundant, and canals were few in number and small in size, there was no call for any specially defined plan. But now that canals are multiplied, and corporations invest immense sums in their construction, with a view to their being a source of income, the necessity for thorough investigation and certain conclusions becomes evident. The subject has already secured the attention of the most distinguished hydraulic engineer resident in Colorado. Mr. E. S. Nettleton, (together with Mr. James Duff, who is at the head of two of the largest Irrigation Works in the State), has, of late, carefully examined into the best modes of measuring and also into the average unit of water for land in various crops. It is probable that the Water Right established as the result of his investigations, will be generally accepted as the Unit. Several canal companies have already done so, and it will be an advantage to the entire State when the one rule prevails everywhere.

The quantity of water which is of late called "The English Company's Water Right"—in use by the Larimer and Weld Irrigation Company and the Northern Colorado Irrigation Company—is the quantity of water fixed upon by that company sufficient to irrigate eighty acres of land. To determine what amount of water is on an average required for this amount of land, compelled careful study of the practices and requirements of irrigation in districts within the State where it has been the most methodically and successfully carried on during the past ten years.

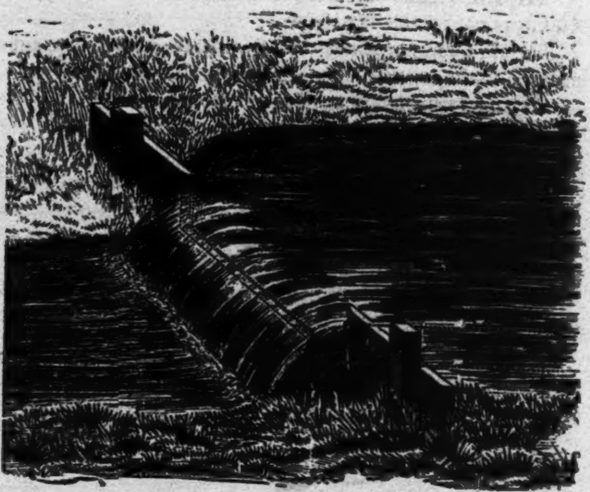
The quantity given by this company for a water right is one and forty-four hundredths cubic feet per second, which is measured by the simplest method possible, at the same time with greater accuracy than can be done when water is delivered under a pressure.

Eminent hydraulic engineers have spent a vast amount of time and money in experiments in determining the quantity of water flowing through openings of all descriptions and conditions, and are united in calling the Weir measurement the most accurate.

This method has been adopted as being not only simple and accurate, but inexpensive, and adapted to a wide range of uses, giving the quantity of water in the smallest irrigation ditch or the largest canal, with equal accuracy.

The Weir method of measuring is simply to pass the water through a notch or opening without pressure; it is simply surface measurement; having the width of the opening given and the height of the water flowing over the bottom of the opening, the exact quantity in a second, minute, or hour can be ascertained.

Heretofore the "inch" method of measuring water has been used as a unit of measure in the selling and rental of water, which was a very good method in early days in Colorado when a small amount of water was to be divided among a few persons. But this system is not practicable in the days of large canals, besides an inch of water may be one quantity or another, differing in some cases nearly one hundred per cent, according to circumstances.



WEIR DAM, FOR MEASUREMENT OF WATER.

The "Inch" as prescribed by the statutes of Colorado and the apparatuses for measuring it is, theoretically about forty-five cubic inches of water every second.

The following will give some idea of the quantity and duty of the Water Right above alluded to:

A water right=$1^{44}/_{100}$ cubic feet per second,

A water right=55 statute inches in equal time.

A water right=one acre of land, $1^{4}/_{10}$ inches deep per hour.

A water right=one acre one foot deep in $8^{1}/_{3}$ hours.

A water right=80 acres of land, 43 inches deep, in 100 days continually running.

The following are short rules for determining approximately the mean velocity in irrigating ditches:

Where v=velocity in feet per second.
Where s=sectional area in feet.
Where f=fall in feet per mile.
Where p=wet perimeter.

FORMULA.

$$v=\sqrt{\frac{s}{p}\times 2f}$$

For actual velocity in irrigation ditches, with irregular cross sections, curves and angles, reduce the velocity obtained by the above rate from twenty to fifty per cent.

ANOTHER RULE.

$$v=\sqrt{\frac{s\times f\times 15}{p\times 9}}$$

For ditches with angles, curves and irregular and ill-shaped cross-sections, reduce the velocity obtained by this rule from fifteen to thirty-five per cent.

We give the following formula for finding the depth of water to pass over a weir, to give a certain discharge in cubic feet per second, when the length of the weir, in feet, and the required discharge are given:

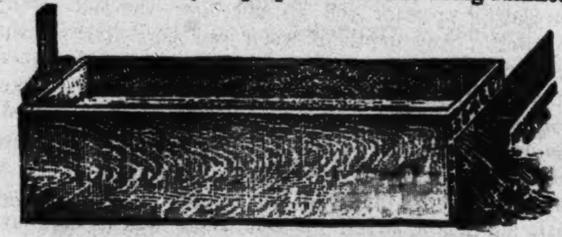
Let h=head in feet on the crest of the weir.
Let q=cubic feet discharged per second.
Let l=length of weir in feet.
Then—

$$\frac{q}{3.33 \times L} = \sqrt[2]{h^3}$$

HOW TO DIVIDE WATER.

The following method of dividing water is the invention of J. Max Clark, of Greeley, and is in use in the canals there and at other points in the State.

It has been demonstrated by "time test" that this flume will deliver (the proper conditions being fulfilled) a like quantity of water in a like time in any part of a ditch, without regard to different rate of flume in different parts of the same canal. Three conditions are necessary for its use to deliver water correctly:



CLARK'S METHOD OF DIVIDING WATER.

1st. The flume must be level.

2d. There must be a free delivery below (that is the water must not back up to the bottom of the measuring gate).

3d. The water must be kept at an even height in the flume by means of the regulating gate, which must be carefully watched and changed to effect this object, as the canal may fluctuate.

The measuring gate must be a few inches above the bottom of the flume so as to check the water current—six inches or more—as the head of water may permit, and bring the water in all the flumes under the same conditions. The measuring gate is generally about fourteen inches wide and the width of the whole flume will depend, of course, on the probable amount of water that may ever be required to be delivered in each particular instance; those in use at Greeley vary from one to six feet in width. They are open at the top and are uniformly three feet deep, that having been found the most convenient depth.

There is a scale represented both across the top of the measuring operator and up and down the side of the opening. Any depth of water can be delivered; the same depth is maintained in all the flumes and the necessary quantity regulated by closing or opening the measuring gate. As for instance, if you adopt as your standard, ten inches deep and you want to give one man fifty inches of water, you would open the gate five inches; if you want to give one hundred inches, you would open the gate ten inches, and if the conditions here named have been fulfilled, the last named will get exactly double the amount of water delivered to the first, no matter at what part of the canal they may be.

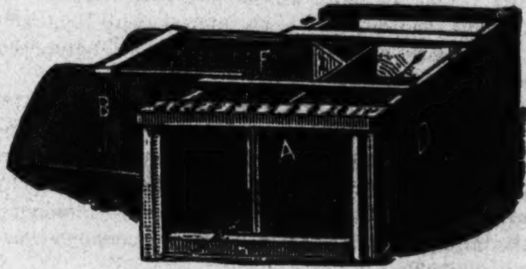
DIVIDING WATER IN LATERAL DITCHES.

I also give a cut of a dividing flume—designed to divide the water in a lateral ditch among the parties using the same, giving each his proportion of all the water in the lateral, whether the water in lateral be high or low.

It is usually made about six feet long, from three to six feet wide (according to the size of the ditch in which it is to be used), and deep enough to carry all the water required of it.

The flume must be set level. It is made of an inch or three-fourths stuff, with two by four stuff for ties and standards, and a two by four check on top of the floor at the up stream—C. At one side is attached the delivering flume B, uniform in depth with D, and of such size as may be needful.

Within these is the movable gate or partition A F, strengthened by the brace I, with arm F long enough to lap on the side of delivery flume B, when A is moved over to the side D.



DIVIDING WATER IN LATERAL DITCHES.

The direction of the water is shown by arrows. The up stream end of A should be sharpened like a wedge. This gate must be of the same depth as the sides, and will of course move under the top cross ties, on one of which is a measuring scale, as shown in the cut.

Suppose there are eight men drawing water through the same ditch. Now it makes no difference whether they divide the water according to the number of acres under cultivation, or by the shares owned by each in the ditch, or by the number of inches belonging to each; or whatever be the basis of division, the first man on the ditch nearest the head, will be entitled to a certain fractional part of all the water, as one-sixth, one-eighth, five-eighths, or some easily ascertained fraction. Suppose he is to have one-eighth. Set the movable gate A so that one-eighth the width is on the side next to the delivery flume, then seven-eighths must be on the other side. A nail or pin through the top cross tie into A will hold it in place. The next man below will be entitled in like manner to a fractional part of what is still in the ditch, and his gate must be set accordingly, and so on to the eighth or last man, to whom belongs all that passes the seventh. The first man has no interest in any division but his own; the last man has an interest in all the divisions, and a very vital interest it is, as all will agree who have been thus situated.

This flume, like the first shown, was invented by Mr. Clark, of Greeley, and has been in use in the laterals under the Greeley canals for eight or ten years, and has given entire satisfaction in all cases. Being easily adjusted it is very convenient in case of an exchange of water among parties drawing from the same lateral—a common practice in Colorado.

CHAPTER V.

AREA OF IRRIGATION IN COLORADO.

I give, in this chapter, the estimated amount of irrigable lands in Colorado, as collated from the various reports of Prof. Hayden and his geological and geographical surveys of Colorado and the adjacent territories. These estimates may be too large; it is difficult to determine with accuracy upon a subject so little known, but the data will be found interesting and perhaps valuable, in connection with the questions that confront the people on the subject of irrigation. Even if a discount of one-third is allowed, it will be found that the area of irrigation is larger than has been heretofore supposed. Fifty million bushels of wheat grown annually in Colorado, is one of the possibilities of the future, though at this time, if such a prophecy was uttered, it would be laughed at.

IN NORTHERN COLORADO.

	Square Miles.
The South Platte	933
Cache-a-la-Poudre	174
Big Thompson	116
Little Thompson	44
St. Vrain	87
Boulder	87
Clear and Ralston	234
Bear	58
Cherry and East Plum	44
West Plum	72
Total	1,849

This gives one million one hundred and eighty-three thousand three hundred and sixty acres in the valley of the South Platte and the valleys of the streams emptying into it.

IN SOUTHERN COLORADO.

	Square Miles.
Arkansas	1,979
Purgatoire	145
Apishpa	87
Huerfano	85
Cucharas	145
St. Charles and Greenhorn	155
Fontaine qui Bouille	145
Turkey	30
Beaver	15
Chalk	30
Oil	45
Currant	15
Total	2,876

There is an area of land susceptible to irrigation lying in Southern Colorado east of the range, of nearly two million acres, about double the amount lying in Northern Colorado along the same eastern slope.

IN SAN LUIS PARK.

	Square Miles.
Rio Grande	500
Alamosa and La Jara	100
Conejos	100
Trinchera	73
Culebra	58
Costilla	29
Gata	15
Total	874

In consequence of the sandy soil and the waste of water, it becomes necessary to allow five cubic feet of water, instead of three, to the square mile in this section of Colorado. This gives an area of five hundred and fifty seven thousand three hundred and sixty acres in this park that can be irrigated.

In the San Juan country, the main stream is the San Juan, which has a fine valley, one or two miles wide, and about fifty long. In this there are three hundred and ninety-two square miles capable of irrigation, making two hundred and fifty thousand acres, distributed in narrow belts in and near the mountains, at elevations varying from three thousand three hundred feet to nine thousand eight hundred and eighty-eight feet.

The Grand River country is at present almost a "terra incognita;" but all accounts that float eastward from it, pronounce it one of the finest and most productive portions of the State. This river, fed by the Uncompahgre, Gunnison, and numerous small streams, unites with the Green to make the great Rio Colorado of the West. Using the language of Prof. Hayden "it consists of Middle Park and the inner slopes of its mountain barriers, a large part of the Park range, the western slopes of the Saganche range, the Elk Mountains, the north and west slope of the San Juan Mountains, the southern portion of the great White River plateau, besides an enormous area of the broken plateau country farther westward." In setting down the arable land on the Grand River, the estimate does not cover the volume of water carried by the stream, which is said to be as much as six thousand cubic feet per second, but only the level arable land contiguous to the stream.

	Square Miles.
Grand River	290
Branches in the park	80
Egeria	30
Eagle	67
Roaring Fork	15
Gunnison and its branches	500
Uncompahgre	200
Dolores	145
Total	1,327

This gives an arable area of eight hundred and forty-nine thousand two hundred and eighty acres, with elevations ranging from three thousand nine hundred up to nine thousand eight hundred and sixty-nine feet. Grasses abound, and some grains can be easily raised at this high altitude. The water supply of this section is probably largely in excess of the lands that lie suitable for cultivation.

The amount of land that can be irrigated on the White River and its branches amounts to one hundred and seventy-four square miles, or one hundred and eleven thousand three hundred and sixty acres, an area by no means sufficient to use up all the water carried by the stream. The belt of cultivable land nowhere exceeds a mile in width, except in Simpson's Park, where the White River Agency, which was the scene of the Meeker Massacre, is located.

The only section now left to be considered is the Yampah; the arable area is on the main stream and its branches, Sage Creek, Williams and Little Snake Rivers. The arable land amounts to three hundred and nineteen square miles, or two hundred and four thousand one hundred and sixty acres. In the month of November, at the lowest stage of the water, the Yampah has been found to carry three hundred and sixty-four cubic feet per second, indicating an abundance of water in the irrigating season for all the land that can be reached for cultivation.

It will be seen, from an examination of the figures given, that there are nearly eight thousand square miles of areas that can be irrigated in Colorado, amounting to over five million acres. Prof. Cyrus Thomas estimates, and Dr. Hayden agrees with him, that twenty-five per cent. of this amount could be irrigated with water from our present imperfect irrigating system. This gives one and a quarter million acres of land fit for cultivation, with only about one hundred thousand as yet in use.

Eleven-twelfths await settlement. So the possible value of the farming lands of the future may be set down at seventy-five millions dollars annually.

In the year 1873, an Irrigating Convention was held in Denver, at which were present the principal agriculturists and publicists of the State. Some of the speakers "went upon the record" as to the amount of land Colorado had water supply for. One considered that there was enough, without a reservoir system, to irrigate seven hundred and fifty thousand acres of land. Another believed that ultimately three millions would be cultivated. Still another—and an engineer at that—solemnly declared that with canals properly constructed to tap the mountain streams, thirty-five millions of acres could be placed in cultivation. Another, an ex-Governor, thought that Colorado had a water supply amply sufficient to irrigate six million acres, an arable area which, in Egypt, in the time of the Ptolemys, supplied food for eight million people.

These points, gathered at random from notes taken at the Convention, I simply offer to show what a wide difference of opinion existed then, and does still, in regard to the amount of land in Colorado that can be irrigated.

CHAPTER VI.

HOW FARMING IN COLORADO PAYS.

Those who raised wheat in the early days of Colorado, say in 1866, when they were paid fourteen cents per pound for what little was grown in the country, if asked to day, if wheat growing paid in Colorado, would probably shake their heads and answer dubiously, "No times like the old times, before the railroads struck the country, when people came with no other object than to get rich quick and then scud back to the States." So too, in regard to potatoes. In the year 1862, there were so many raised in the territory that farmers offered to give them away to any who would take the trouble to dig them up. One farmer declares that he raised one potato that year weighing eleven and a quarter pounds. Those who raised this tuber in that year, probably came to the conclusion that, as a whole, farming was a mighty uncertain and unprofitable pursuit. Again, take for instance, the man who saw an army of grasshoppers settle upon his grain field, and in a few hours destroy it utterly. He, too, looking through glasses colored by circumstance, will declare that the losses — one year with another — overbalance the profits, and that "there is no money in farming in Colorado."

It was customary for journals and immigration agents, in some quarters, a few years ago, to argue that farming could not be profitable in Colorado, save under exceptional circumstances, and with a high priced market. But, as a writer in the Denver "Rocky Mountain News," as far back as 1873, said "there has been enough of success at farming in Colorado to prove the contrary; not only that farming can be successfully carried on here, but that it can be followed with a larger and more certain annual profit than in any other part of the United States."

It is a safe assertion to make that four annual crops out of five can be successfully raised in the State, and this is as good an average as ought to be asked for, or is had elsewhere. The area of arable land is not so large as to induce ruinous competition at home, and the distance from the grain-producing districts of other States and Territories is great enough, not to shut out competition, but to make the competing price a fair one for the farmer. A constantly increasing mining interest is a sure guarantee of an ever ready market for all that can be produced.

At one of the Colorado Farmer's Institutes, held a year or two ago, it was asserted that wheat could be raised for fifty cents per bushel. This is a very low figure, and one not reached by any calculation given in this chapter. Others put the figure at sixty-five cents.

But few farmers keep accurate accounts by which they can arrive at satisfactory conclusions as to the cost of the crops they raise each year. A farmer's account book should be considered a necessity on every farm. Then a little care in making proper entries will give the data from which he can decide as to future operations. The profit in farming here, as in other places, lies concealed in many little things of which no account is taken. In the wastage of the farm vanishes many per cent. that might be added to the general aggregate of profit.

Before giving tables prepared by farmers during the last eight or nine years, I submit a general estimate of the cost of raising wheat on old and new land:—

Purchase price, new land, $800; old land, $1,400 to $1,600.	*Cost of cultivation on new land.*	*Cost of cultivation on old land.*
Interest on cost @ 10 per cent	$ 80.00	$160.00
Interest on Water Right	40.00	40.00
Plowing	176.00	100.00
Harrowing	80.00	80.00
Seed	75.00	75.00
Labor of two Irrigations	80.00	80.00
Harvesting and Stacking	200.00	200.00
Threshing 15 bush's on new, 25 on old land.	128.00	192.00
Marketing	48.00	72.00
Totals	$907.00	$999.00
Estimated yield from new land	1,200 bushels.	
Estimated yield from old land		2,000 bushels.
At 2 cents per lb., or $1.20 per bushel	$1,440.00	$2,400.00
Net profit	553.00	1,000.00
Per acre	6.67	12.50
Cost per acre	11.46	12.48

Here is another estimate, based on a single acre, from a farmer in the valley of the St. Vrain:

Interest on land	$2.00
Plowing	1.50
Seeding and Harvesting	1.00
Seed	1.50
Irrigating	1.00
Cutting and Stacking	2.50
Threshing and Storing	2.00
Total	$11.50

Average yield twenty-two bushels. Selling price one dollar per bushel. Net profit ten dollars and a half per acre.

In the year 1873, Mr. William Lee, a farmer in Clear Creek Valley, within five miles of Denver, kept an account of his crop of wheat on his home farm of one hundred and twenty acres. It ran as follows:—

Plowing, Seeding, and Feed	$274.20
Harvesting and Stacking	243.30
Threshing	86.50
Two men, 7 months, @ $40 per month	560.00
Water, 100 inches, @ $1.50	150.00
Seed, 240 bushels @ $1.50	360.00
Total	$1,674.00

Received 1,800 bushels of wheat, being an average of 14½ bushels per acre. Sold @ $1.38. Total.	$2,484.00
Net profit from 120 acres	$810.00
Net profit per acre	6.75

It will be seen that the crop was very small per acre, and the labor expense very high. Now labor only costs twenty dollars to twenty-five dollars per month. The "Colorado Farmer," from which this account is taken, said of it "This having been an unfortunate year (the grasshoppers paid a visit to the State that season) for Colorado farmers, the profits realized are very small, yet it gives a correct idea of the expense attending the cutting of the crop mentioned, and reliable data as to what the profits may be in a good year with a fair yield. Looked at in this light it is not discouraging. Any one can see that with a full yield and fair prices, the profits would be remunerative, as everything above the yield set down would be comparatively clear gain." Had Mr. Lee got an average yield of twenty bushels, on which every farmer can count, in ordinary seasons, his net profit would have been at least double what it was. This table is given to show what may be expected in an unfavorable season.

Two years later, J. Max Clark, of Greeley, printed in the "Tribune" of that town, what he called "A nice little story about myself, and my doings and beliefs in the business of farming in Colorado." After preliminary remarks that are more local than general in their nature, and need not be quoted here, he gives his

FARM ACCOUNT FOR 1874.

EXPENSES.

One hand, 5 months @ $25 per month	$125.00
Board for same @ $15 per month	75.00
Extra help Harvesting	50.00
Extra help digging Potatoes	100.00
Wheat—75 bushels for Seed and Family use	125.00
Seed Potatoes—200 bushels	200.00
Hay and Corn for Team one year	150.00
Interest on farm land, team and tools, $2,000 @ 18 %	360.00
Wear and tear of Implements	25.00
Total	$1,210.00

RECEIPTS.

1,130 bushels of Wheat @ $1.50 per bushel		$1,695.00
900 bushels of Potatoes @ $1.00 per bushel		900.00
Total		$2,595.00
Net profit	$1,385.00	
Net profit per acre	17.31	

Mr. Clark did not give the amount in wheat and potatoes, so the two could be shown separate. It shows how mixed farming paid in 1874, even at one and one-half per cent. a month interest.

FARM ACCOUNT FOR 1875.

EXPENSES.

Labor for 6 months		$210.00
Extra help Harvesting		12.00
Extra help digging Potatoes		125.00
Extra help husking Corn		50.00
Incidental help		20.00
Sixty-five bushels Seed Wheat		97.00
200 bushels Potatoes		200.00
Hay and Corn for Team one year		150.00
Interest on Land, Team, and Tools		360.00
Wear of Tools		25.00
Total		$1,249.00

RECEIPTS.

1,050 bushels of Wheat		$1,575.00
1,500 bushels of Potatoes		750.00
600 bushels of Shelled Corn		360.00
Total		$2,685.00
Net profit	$1,436.00	
Net profit per acre	15.78	

It will be seen that Mr. Clark's farming got a little mixed, including corn among his crops. But to make the result still better, he adds "I should say that the past season, having bought more land, I cultivated ninety-one acres instead of eighty, for the year previous. In this account I have not included any returns from the garden, nor of between seven or eight tons of beets raised in the two years and fed to my cow. I have also omitted the item of taxes, because they no more than fairly offset the use of my house and garden. It will thus be seen that the gross receipts from my farm in two years, amounted to five thousand two hundred and eighty dollars, and afforded a clear return for one man's labor, over and above a liberal allowance for every item of expense of one thousand four hundred and five dollars per annum."

Is it any wonder that, when such an intelligent farmer is asked his opinion of Colorado as a farming country, he should give it in such words as these? "I answer without hesitation that I consider it incomparably superior to any of the Eastern States. But when I say this, I mean for the intelligent, systematic farmer, for I know of no country in the world offering fewer inducements for what I call numskull agriculturists, than this, and I like it all the better for that. Here only the wise succeed, the fools all fail and go to the wall. He who, in his ignorance presumes to tackle our soil in the ordinary, unthinking, unskillful, bungling manner, is only answered by an empty jeer. The finest discernment, the closest observation and understanding, together with the most perfect manipulation, are required to obtain satisfactory results. Not every man who grows corn in Iowa and Nebraska for ten cents a bushel, can succeed in producing wheat in Colorado for a dollar and a half a bushel, and all that class of men of migratory habits, emigrating from extreme Eastern or Southern States, who have rented land in every State from the original roost westward, and never succeeded in owning a foot of their own, may as well pass us by on the other side. This is no country for them. But to the farmer by profession, skilled in his art and calling, we can offer such inducements as can be offered by no other locality. Our soil, properly and judiciously worked, is rich in returns, and our peculiar position, the wide strip of arid plain between Colorado and the fertile limits of Kansas and Nebraska, the really insignificant portions of our land which cannot, by any system of cultivation, become available for agricultural purposes, and the resulting fact that the farming interest can never more than equal the demands of the other industries of the State, make the outlook for our farmers, in the immediate future and for all time, in every way desirable."

In 1879, George W. Buell, also a farmer of Greeley, kept an account of the expense and profit of wheat culture on a patch of sixty-five acres. He says, under date of February 12th, 1880, "Much has been said concerning the cost of raising crops under irrigation, and especially of wheat; and in order to satisfy myself upon this subject, I opened an account with each of my crops grown last year, charging the crop for the actual labor put upon it, at a fair price, also the cost of seed. My account stands thus for my

WHEAT FARM OF SIXTY-FIVE ACRES.

Eighty bushels of seed wheat	$ 80.00
Plowing, 13½ days, @ $4 per day	54.00
Putting in 25 acres with cultivator	20.00
Use of drill for 23 acres	2.30
Vitrioling seed wheat	3.00
2¾ days' drilling @ $4	11.00
½ day plowing ditches	2.00
Irrigating 65 acres @ 25c. per acre	16.25
Cutting and binding @ $2 per acre	130.00
Six days' shocking @ $1.50 per day	9.00
Seven days' stacking, 1 team, 2 men	38.50
Threshing bill, including hands	68.88
Cost of 1,096 bushels in bin	$434.93
Cost per acre	$6.69
Cost per bushel	0.40
Yield per acre	16¾ bushels.

Mr. Buel at the time of making this statement had not sold his crop, so he gave no figures as to profits. But presuming that he received two cents per pound, or one dollar and twenty cents per bushel, the net profit is shown to be seven hundred and eighty dollars, or twelve dollars per acre.

We give another table, from which it would seem as though a fair case had been made out in favor of Colorado farming. This table, covering a period of five years, from 1875 to 1879, is furnished by Mr. A. L. Emigh, of Fort Collins, Larimer County, one of the most intelligent and successful farmers in the State.

FIVE YEARS OF WHEAT CULTURE.

Year.	*No. bushels per acre.*	*Receipts per acre.*	*Cost per acre.*	*Profit per acre*	*Highest price in the year.*	*Lowest price.*	*Average price.*
1875.	24½	$33.71	$14.50	$19.20	$1.56	$1.20	$1.38
1876.	26	36.40	12.00	24.40	1.80	1.50	1.46
1877.	26	32.24	11.00	21.24	1.50	1.00	1.25
1878.	16½	12.60	9.00	3.60	1.00	.54	.77
1879.	26	23.40	9.40	14.40	1.20	.60	.90
Average	23 4/5 bu.	$27.67	$11.18	$16.40			$1.14

The figures for the year 1878 differ so much from the others that the reader will naturally desire to know the reason why. Mr. Emigh accounts for it by saying that the wheat was injured by smut to such an extent that he deducted one-third of the actual yield on that account. Of his experience for the years 1880 and 1881, Mr. Emigh writes "the average of the last two years would be but little different in results. My expenses for the seven seasons just closed, have been carefully kept, and amount to three thousand three hundred and fifty dollars on three hundred acres in crops, three hundred and fifty dollars worth being permanent improvements. The crop consisted of two hundred acres in wheat, seventy acres in oats, twenty-five acres hay, four and one-half acres in corn, one-half acre in potatoes and garden stuff. The entire crop brought eight thousand dollars cash, leaving a profit of five thousand dollars. I estimate the profit on wheat this year to be nearly nineteen dollars per acre."

Touching upon the difference of opinion existing among farmers concerning the cost and profit of farming in Colorado, he adds, "I think this difference is largely due to the kind of land in cultivation. The cost of raising a crop of wheat is from ten to eleven dollars per acre, or fifty cents per bushel. I have raised some for as low as thirty cents, but more for seventy-five cents. I think farming should pay, taking an average of years, at least ten dollars per acre on most land, in a variety of crops. A good farmer, on fair land, can do much better than this, say from twelve dollars to fifteen dollars per acre."

Evidently farming pays in Colorado.

The opinion prevails throughout the Eastern States, and in some measure is believed as well in Colorado, that the State is not a corn country. The assertion is made, over and over again, that Colorado is not a corn country. True, to a certain extent. The altitude and the cool nights are against the culture of this grain. Yet it will surprise some to know that Colorado compares favorably with some of the boasted corn States of the East, as regards the profit, at least, of raising it. The figures to be given in this connection will prove it.

In 1873, Mr. William Lee, of Clear Creek Valley (whose experience in wheat culture that year has already been given), kept an account of the expense attending the growing of eight acres of corn, which showed the following result:

EXPENSES.

Five days plowing, @ $4 dollars per day	$20.00
Planting	6.00
Eighty-five pounds of seed @ 5 cts	4.25
Marking both ways	4.00
Working both ways in May and June	23.00
Hand weeding	7.50
Working 1½ days with corn plow	6.00
Making irrigating furrows	2.50
Irrigating cost @ $2 per acre	16.00
Total	$89.25

RECEIPTS.

184 bushels of corn, netting	$237.00
Yield per acre	23 bushels.
Cost of cultivation, per acre	$11.15
Profit on eight acres	$147.75
Profit per acre	$18.47

In the above there is no charge for gathering the corn. This is offset by Mr. Lee by the value of the fodder, which is not taken into the account of receipts. This is a very good showing for corn in Colorado in a year when all crops were below the average.

Six years later a farmer in Greeley gives his little corn story of the year as follows:—

EXPENSE.

Six days plowing @ $4	$24.00
One and a half day's working @ $2.50	3.75
Three days planting @ $1.50	4.50
Seed corn	1.00
One day dragging	4.00
Five days with cultivator @ $4	20.00
Four days cutting furrows	6.00
Five days irrigating @ $1.50	7.50
Ten days cutting fodder @ 1.50	15.00
Twenty-five days husking @ $1.50	37.50
One day hauling fodder	5.00
Total	$128.25

RECEIPTS.

600 bushels of corn @ 60 cts	$360.00
5 loads of fodder @ $10	50.00
Total	$410.00
Yield per acre	19 bushels.
Cost of cultivation per acre	$ 6.75
Profit on 19 acres	$281.75
Profit per acre	14.83

Corn, it will be seen, was cheap in the Greeley market in the year 1879. The difference between the ruling price of 1873 and 1879 is very remarkable. But the times were changing. Big prices for produce as well as big outlay for labor were among the things of the past. Still the corn-grower was well pleased with the result. The proof was clear that corn could be grown in Colorado.

The next year a farmer in Jefferson County planted one hundred acres. Here is his story from his book of accounts:—

EXPENSES.

Interest on 100 acres	$250.00
Interest on team and tools	80.00
Two men's work for 9 months	450.00
One extra team for plowing	25.00
Feed for teams	125.00
Feed for men	200.00
Seed	25.00
Extra expenses	25.00
	$1,180.00

RECEIPTS.

2,500 bushels @ $1		$2,500.00
Corn fodder		200.00
Total		$2,700.00
Yield per acre	25 bushels.	
Cost of cultivation per acre	$11.80	
Profit on 100 acres	1,520.00	
Profit per acre	15.20	

These three instances are cited, covering a period of seven years, to prove that Colorado, after all, is a pretty good country for corn. It will pay farmers to disabuse themselves of the notion they have that there is no money in the crop, and give more attention to it in the future. The fact that hundreds of thousands of dollars go out of the State every year to benefit the corn growers of Illinois, Kansas, Indiana, and other States, should waken them up to their best interests. Colorado may not be able to lead in the average of corn per acre, as she does in wheat, where she stood in 1879 in the front rank with her twenty-three and one-tenth bushels per acre, while Indiana stood next best, showing twenty and three-tenths bushels, and Illinois eighteen and seven-tenths bushels. Still an average yield of twenty-four bushels is not bad. It is far above that of every Southern State, and within nine bushels of the average yield in Indiana, Kansas, and New York.

Two years ago the publishers of a western journal offered certain cash prizes for experimental acres in the culture of corn. In looking over the reports upon the two-acre tracts that carried off first and second premium, and getting at the net profit, there is but little to boast of over the profits of corn raising in Colorado with common field culture. The value of the corn taking first premium was fifty-three dollars and ninety cents. The cost of cultivation, thirty-four dollars. Leaving a net profit of only nineteen dollars and ninety cents. The second premium acre gave a net profit of only seventeen dollars and seventy-five cents. In the one case the corn was Blount's Prolific; in the other, Chester County Mammoth. In both instances the soil was heavily fertilized, and close, frequent cultivation was practised. If the interest on the land or its rental value had been added to the expense, a reduction of from three dollars to five dollars would have occurred, putting the profit—even on a basis of a yield of over one hundred bushels—below that realized in Colorado. As the average yield in Indiana, as already stated, is but thirty-three bushels—if it pays to raise corn there at thirty-five cents per bushel, it surely will do so to raise it at one dollar per bushel in Colorado.

Oats, as a staple, is a crop too much neglected in the State. It is not clear why this is so, for the culture is no more expensive, the yield is abundant, and the price obtained excellent, ruling the last season at two dollars and ten cents per one hundred pounds. Mr. George W. Buell, of Greeley, gives his account of the expense of raising six and a half acres of oats, as follows:

EXPENSE.

Plowing, 2¼ days @ $4.00	$ 9.00
475 lbs. seed @ $1.70 per hundred	8.81
Use of drill	.65
One day drilling	4.00
Irrigating	3.00
Cutting and binding @ $2.00 per acre	13.00
Shocking	1.00
Stacking	5.50
Threshing bill, including hands	11.91
Sacks	6.00
Hauling two loads to market	3.00
Total	$65.87

RECEIPTS.

6,353 lbs. @ $1.70 per 100 lbs.	$108.00
1,880 lbs. retained for seed	37.00
Total	$145.00
Yield per acre	1,266 lbs.
Cost of cultivation per acre	$10.00
Profit on 6½ acres	80.23
Profit per acre	12.34

This is not a bad showing, and should incite to a greater breadth of seeding to such a sure and profitable crop.

Having shown how farming pays in Colorado, as far as the cereals are concerned, it may not be without interest to give some figures in reference to the potato and its culture, showing what money there is in this article of general consumption, of which the State does not grow one-fifth part of the demand for home use. It would seem as though only certain strips of country are adapted to the successful growth of the potato. In San Luis Park they never fail. On the Divide, a crop is generally certain. In the foot-hills, they are counted on as sure. But in most of the valleys they fail, year after year. In the Cache-la-Poudre Valley, this does not hold good. The Greeley potato is a synonym for excellence of quality and size. Experiments are being made at the Agricultural College to discover, if possible, the cause of failure in this important crop, but as yet nothing of practical benefit has resulted therefrom.

The following is an exact account of the expenses and receipts attending a crop of forty acres, raised on upland soil, just north of the town of Greeley. It is as accurate as figures can make it:

EXPENSE.

300 bushels of seed @ 30 cents	$ 90.00
Nine days' plowing, 4 horses, 1 man, $6.00 per day	54.00
Seven days' planting, 2 horses and 2 men @ $6.00 per day	42.00
Two days' harrowing, 4 horses, 1 man @ $6.00 per day	12.00
Twenty days' cultivating, 2 horses, 1 man @ $4.50 per day	90.00
Sixteen days' irrigating, 1 man @ $1.25 per day	20.00
150 days' digging, at $1.37½ per day	205.50
Hauling to market, 80 loads @ $1.50	120.00
Cost of sacks	153.45
Interest on land and water, $1,000 @ 12 per cent	120.00
Interest on teams and tools	50.00
Total	$956.95

RECEIPTS.

By sales made	$2,965.31
By 400 bushels on hand, at 90 cents	380.00
Total	$3,345.31
Balance in clear profit	$2,388.36

The above is an extraordinary yield, and is not to be accepted as occurring every year. Another instance may be cited, occurring last year. The figures are given by Mr. Geo. W. Buell, whose accounts of wheat and potato raising have already been given. He is a gentleman of unimpeachable veracity, and his statements can be accepted as accurate:

EXPENSE.

Six days' plowing @ $4.00 per day	$ 24.00
Three and a half days' planting @ $5.50 per day	19.25
One hundred bushels of seed @ 30 cents	30.00
Five days cutting seed @ $1.50	7.50
Five days cultivating @ $3.00	15.00
Six days cutting weeds with hoe @ $1.50	9.00
Five days irrigating @ $1.50	7.50
Eighty days digging @ $1.50	120.00
Forty loads, hauling, @ $1.50	60.00
Sacks and twine	110.00
Total	$402.25

RECEIPTS.

2,456 bushels @ 70 @ 75 cents		$1,766.16
250 bushels in store, valued @ $1.00		250.00
Total		$2,016.16
Cost of cultivation per acre	$20.11	
Profit per acre	80.69	

In the line of general garden stuff, only one case will be cited, this chapter being longer than was intended; but the facts crowd in upon the author, and the figures are so favorable that the question of profit seems settled.

The "Times," published at Buena Vista, in Chaffee County, gives some interesting facts connected with the culture of ten acres of ground near that flourishing little town, that go to prove how prolific the soil of Colorado is for root culture.

On ten acres of ground, Mr. George Leonhardy harvested, in the season of 1881, eighty-seven thousand six hundred and forty pounds of potatoes, for which he obtained three cents a pound. On two acres he raised thirty-two thousand pounds of ruta bagas, worth six hundred and forty dollars. On half an acre of ground he raised carrots, beets, parsnips, etc., valued at two hundred dollars.

With these statements, the case is submitted to the general court of the people, as having been proven that FARMING PAYS IN COLORADO.

CHAPTER VII.

CACHE-LA-POUDRE VALLEY.

The stream above named is the most northernly in the State, and one of the principal feeders of the South Platte River. It is taken, therefore, as the starting point for a descriptive account of the various farming sections of the State. There is a fork called the North Fork, emptying into the main stream above Fort Collins. The waters of this branch, as yet, are utilized only when they reach the channel of the main stream; but there is a fine breadth of agricultural land lying north of the town mentioned, and stretching from this fork of the Poudre eastward to Box Elder creek and beyond, reaching to the line of the Denver Pacific branch of the Kansas Pacific railway. The supply of water from this fork is not equal to the irrigation of any very great part of this land; but a system of reservoirs, connected with a canal, is in contemplation; when built, some very desirable railroad and Government land will be brought under cultivation; the former belonging to the Denver Pacific and the Union Pacific railway companies. The Colorado Central branch of the latter railway runs through a portion of this tract, so that communication with the Cheyenne (on the Union Pacific) market on the north and Denver on the south, is direct. It is claimed that over one hundred thousand acres can be covered and watered by such a canal, when constructed, but this estimate is too large. Thirty thousand acres, perhaps, can be utilized from what is now but a cattle range and turned to agricultural uses.

From La Porte to its junction with the South Platte, thirty miles below, the Poudre Valley is one vast network of irrigating canals, mainly taken out upon the north side of the stream. It was in this valley, in 1871, that the completion of an irrigating canal of the Greeley Colony, and its successful working, gave the first impetus to farming in Colorado, and demonstrated the value of the valley lands, opening up the vast possibilities of a country hitherto supposed to be destitute of one of the most important industries of a State. Before it was built, a few small ditches skirted the lower edges of the bluffs, and watered the hay-lands of the first bottom, as the lands adjoining the stream are called. During the summer season the river ran bank full, and filled these ditches without the requirement of dams or any of the methods now employed in connection with larger artificial water courses.

It is found, now, that so many large canals have been built, drawing such an immense volume of water from the stream, that these small ditches are comparatively worthless for practical purposes, and it is one of the many questions connected with irrigation, yet to be settled by the courts, as to the right of large corporations to deprive the many owners of small ditches of the equities they possessed in the flow of water at the time they constructed their ditches.

Nearly a score of large canals, varying in length from ten to thirty miles, utilize the water from this stream, and others are in course of construction. These canals cover over one hundred and fifty thousand acres of arable land, while those now building will add perhaps seventy-five thousand more. This amount of land is not all in cultivation, or likely to be. During the season of 1881 not more than thirty thousand acres were under plow.

In 1871 the Greeley canal was built, covering some twenty-five thousand acres, stretching from its head, about twelve miles west of the town, to a point east of the Denver Pacific railway, a length of twenty-seven miles for the canal proper, with innumerable laterals traversing the breadth of land between it and the stream, a varying width from two to four miles. The canal is thirty feet wide, four and a-half feet deep, with a sectional area of one hundred and three feet, running at a velocity of a little over four feet per second, and delivering five hundred and eighty-five cubic feet of water per second. The land under this canal is enclosed in a common fence, protected by an Act of the State Legislature, cared for by a tax on all the land protected by it. The canal itself, built originally by the Union Colony founded by Meeker, Greeley, and others, in 1870, is now owned by the farmers themselves. A fixed number of water rights have been issued, and these are subject to assessment for superintendence and repairs, annually amounting to sixteen dollars per water right for eighty acres, or twenty cents per acre. For this, forty inches of running water, under a fixed pressure, are given each year. The canal is considered to be one of the best constructed in the State, having been built under the direction of the ablest Civil Engineer residing in Colorado, Mr. E. S. Nettleton, whose name is thus indelibly identified with the development of the agricultural resources of the State.

A small canal, taken out of the south side of the stream, about four miles west of the town of Greeley, waters the garden lands about the town and makes perhaps three thousand acres tillable. The waters flow through the streets of Greeley, furnishing the inhabitants with water for household purposes as well as for the irrigation of trees that line each street, and the flowers that bloom so profusely about the houses. Greeley has been termed the Garden Town of Colorado because of the multitude of gardens within its limits, and the Forest City on account of the trees that abound in it.

Either name is appropriate, but it will live in history as an enduring memento of the two men who conceived and fostered it—Horace Greeley and Nathan C. Meeker.

Half-way between Greeley and Fort Collins—distant twenty-five miles—is the dividing line between Weld and Larimer counties. At this point there is a settlement and post-office known as Wheatlands. After passing the colony fence the lands become tributary to Fort Collins, the county seat of Larimer county. It is noticeable, here, that the lands on both sides of the stream are in cultivation, and this point is the center of a large and steadily increasing farming population. The canals are large and numerous, carrying a volume of water that would lead one to suppose but little would be left in the stream to supply the canals below, watering the farming lands about Greeley, and no doubt some apprehension is already felt, on the part of the latter, about the future. The water question becomes a serious one when there is a short supply.

Brief mention is made of some of the main canals in this neighborhood, as follows:

The Lake Canal, projected in 1872, is twelve feet wide and fifteen miles long. Its first cost was seven thousand dollars. It covers eight thousand acres, of which three-fourths are in cultivation. Water rights under this canal give sixty-five inches of water for the season. Land under this canal—unimproved, but carrying the right to water—ranges from twenty dollars to thirty dollars per acre.

The Box Elder Canal has one of the oldest charters in existence, dating back to 1863. It heads three miles above La Porte, is now seven miles in length, but is being extended to cover several thousand acres of choice land lying along the creek that gives its name to the canal.

The Cache-la-Poudre Canal, also on the north side of the river, is eight miles long, covering four thousand acres, every foot of which is under cultivation. Here are some of the oldest and best farms in the valley. It was built in 1866, and does not extend far on the uplands, but covers second bottom lands mainly.

The Mercer Ditch, originally chartered in 1862, was re-chartered in 1872, and enlarged. It is now twelve feet wide and thirteen miles long. Ten thousand acres are under it, one half at present cropped. Water rights give from sixty to eighty inches per season, with yearly taxation for superintendence and repairs.

Canal Number Two, was projected by the Fort Collins Agricultural Colony in 1872, and built at an expense of fifteen thousand dollars. It is twelve feet wide and eleven miles long, covering in the neighborhood of ten thousand acres, three-fourths being yearly cropped. A large area is being watered for hay farms under this canal. The land is on the south side of the river.

Pleasant Valley Canal was chartered three years ago. It heads in the mouth of the canon and runs to a point called Fossil Creek, a distance of sixteen miles. Eight thousand acres are fenced and cultivated. The water is only sold to those who hold stock in the company. Shares are valued at one hundred dollars each; as the canal runs four thousand inches of water, it would seem as though a share entitled the owner to only sixteen inches of water, and the owner of eighty acres would need to own at least four shares to furnish him with the amount of water he would need for his land.

The Larimer County Canal, on the south side, and the North Poudre Canal from the north fork of the river are in course of construction. The first is expected to water from ten to fifteen thousand acres; the last from fifty to one hundred thousand.

Besides the foregoing, there are other corporate canals and numerous private canals, or ditches, as the smaller irrigating channels are termed, owned by individuals, and lying mainly in the bottoms. These were among the first constructed, before capital came and corporations were created to control vast areas of land.

The most important irrigation works of all in the Valley, still remain to be noticed. The Larimer and Weld County Canal, the property of the Colorado Mortgage and Investment Company of London (Limited), an English corporation, is the second largest in the State. Two years ago it was distinctively "the grandest irrigating enterprise of the age in the Rocky Mountains." It covers sixty thousand acres of very fertile soil, lying contiguous to three lines of railroads, reaching Cheyenne and the Union Pacific railway on the north, the Burlington and Missouri railway on the east, and the Kansas Pacific, the Denver and Rio Grande and the South Park railways on the south, thus giving immediate communication with all the markets of the State, and with Chicago, Kansas City, and Santa Fé. Over twenty thousand acres of this choice land have been secured by the company constructing the canal, and is being placed on the market for settlement upon easy terms, covering a period of five years for both land and water, which last can be purchased in perpetuity at reasonable rates, ensuring a water right. These excellent farming lands lie along an undulating slope of country, stretching between Fort Collins and Greeley, a distance of twenty-five miles, on the upper side of the river, and above the lands covered by the Lake Canal of Fort Collins and the Farmers' Canal of Greeley. Ample irrigating privileges are provided for—even in seasons that are likely to occur in Colorado, when a mild, open winter has prevented the usual amount of snow from falling upon the ranges, to be melted and flow down when the warm weather sets in—by a system of lakes or reservoirs upon the main line of the canal, where an abundant quantity of water can be held in reserve for the day when an imperative need for a supply from a source other than the stream itself is required.

This canal is the largest in operation in Colorado. It will lose this distinctive title when the High Line Irrigating Canal of the Platte Land Co., taking water from the South Platte to irrigate the lands in the vicinity of Denver, is constructed. The dimensions are as follows: average width on the bottom from the head to the first large reservoir, distance fourteen miles, thirty feet; thence to Coal Creek, fourteen miles, twenty-five feet; thence to Lone Tree Valley, distant fifteen miles, twenty feet; from this point to the extreme end, the width is gradually decreased to fifteen feet and less. The banks, which are five and a half feet high, are constructed so as to carry a volume of water five feet deep for the first fourteen miles, decreasing gradually to the end. The embankments on the lower side, where the canal crosses an incline, are so substantially constructed that they are as permanent and endurable as the natural, undisturbed earth. The reservoirs are basins or depressions. It has been found that in similar lakes, when once filled with water, very little is lost during the winter, even when no inlet is allowed to remain open; therefore, when they are once filled, the supply is assured. The fact that the current of the main canal passes directly through these reservoirs, thus changing and keeping pure the main volume, will make of these lakes the finest fishing grounds imaginable. There are three of these reservoirs, containing respectively, one hundred, one hundred and twenty, and one hundred and eighty acres, ranging in depth from fifteen to twenty-five feet.

The history of the settlement of Greeley, Evans, Longmont, Fort Collins, and other towns, by a system of colonization, has been written elsewhere in this volume. The question naturally arises, in this connection, can new colonies be established, upon the same plan, with the same assurance of success? Given a fortunate selection of site, a company of intelligent farmers with means sufficient to construct an expensive canal, and to live comfortably until a crop is raised, an affirmative answer can readily be given. Gradually the land changes from barren plain to cultivated fields. Comfortable homes, schools, churches, lyceums, newspapers,—indeed, all the auxiliaries of a settled and civilized community, take root, grow, and flourish. The disaffected and the indolent—for such exist in every community—shake the dust off their feet and depart; but the enterprising, the thrifty, the earnest, remain, and the valley begins to smile with bloom and verdure, opening up the bright possibilities of the future to those who had the patience to wait, the energy to work, and the will to conquer all the difficulties that might present themselves.

Such has been the case in the past, such may be the case in the future. It is possible that no such colony as the Union Colony of Colorado, called together by the magic of the New York "Tribune" and its founder, can again be organized. But the ideas so successfully carried out by them have been, can be, and are being crystalized, as it were, through corporate companies, formed for the purpose of incurring the great expense of constructing canals; making them a legitimate source of revenue, yet conferring an inestimable privilege upon those who have not the capital to put into the investment. So it happens that, in these days, one man, or ten men, or an hundred men, can come to Colorado with their families and find the maximum of agricultural advantages ready for them at a minimum average of expense. As an illustration of what has been done and is being done by such corporate bodies to aid in extending the area of arable land in Colorado, and enable settlers to obtain, occupy, and eventually own farms, the action of the projectors and owners of this great canal may be cited here.

In order to give my readers a clear idea of the plan pursued, and to show how favorable it is to those who are not in a position to pay down the price of a farm, let us assume that the intending settler contracts to become the purchaser of eighty acres of land, with water enough for irrigating purposes. Here is the story of the first and second year:

Eighty acres of land, water for the same	$1,800	
One-fifth payment down being required amounts to		$360
Cost of home of two or three rooms		100
		$460
His expenses for the first year may be about as follows:		
Mules or horses, harness and wagon	$300	
Cow and poultry	45	
Seven months' feed for team	75	
Furniture, bedding, fuel, light	75	
Farm and garden implements	50	
Seed—wheat, oats, corn, and potatoes for 40 acres	100	
Cost of harvesting crop	75	
Living expenses, taxes, interest, incidentals	115	$835
Total expenses for the first season		$1,295
From this must be deducted, for what may be held as realty or lands, building, stock, furniture, etc.		800
Leaving the actual outlay of expenditure		$495
The proceeds of the first season's crop, provided the season has been favorable, and the harvest a fair one, will be:		
Wheat, 25 acres, 15 bushels to the acre, 375@$1		$375
Oats, 15 acres, 20 bushels to acre, 300@50c		150
Corn, 10 acres, 15 bushels to acre, 150@60c		90
Potatoes, 5 acres, 60 bushels to acre, 300@$1		300
Total		$915

The actual outlay for expenses being only four hundred and ninety-five dollars, a balance of four hundred and twenty dollars in favor of the first year is left, or one-half of the amount expended in land, water, buildings, and stock.

The second year's exhibit will be still more favorable to the hopeful husbandman, inasmuch as the sod ground is now in better condition, and will yield at least one-fourth greater crops than the first year. At the end of the season, with sixty acres in crops, and including the purchase of a reaping machine, he will be a poor farmer who does not find a surplus, after paying all expenses, and making the second annual payment upon land and water, of at least five hundred dollars in his pocket, nearly enough to clear off the payments that cover three succeeding years, and so have a deed for his farm, and a home henceforth for himself and family, from which he can make a handsome living.

It will be seen from this, that any settler, coming to Colorado with one thousand dollars can easily, at the close of two favorable seasons, find himself the owner, in fee, of eighty acres of land and a good home, all made out of the soil. Those coming with one-half that amount would find it more difficult to manage, yet need not be discouraged to make the attempt. They have these advantages in their favor: a healthy climate, a fertile soil, a guarantee of water, a rapidly settling country, an assured market, and bright prospects for the future. The feeling of isolation which rests upon the lone homesteader in a new country with such depressing weight, does not rest upon him here. In this lies the great advantage of settlement upon lands where capital has already extended its beneficent influence, and paved the way for an immediate return to the farmer for what he invests. There is no delay. The time required to construct a small canal in some valley far away from railroad facilities, or social privileges, is saved him, while the cost, spread over five years, is easily borne. The first season, even, is not lost, provided he enters upon his land early enough to plow it and sow his seed. Ere six months have passed, his venture has returned to harbor, laden with a rich return.

It will be seen, therefore, that there are certain advantages accruing from this method of securing farms that are worthy of consideration by those who expect to build up a new home in a new land. Special facilities for transportation can be secured, and it can be so arranged, sometimes, that families coming from one neighborhood can select lands lying contiguous, and the social intercourse so long and pleasantly maintained in the East, be continued in the West, under the broad, benignant shadows of the Rocky Mountains.

The foregoing is presented, not for the purpose of inducing farmers to especially select this valley for a home, but simply to show what can be secured here, now that the era of colonization by coöperation has passed away, in Northern Colorado, by reason of the occupancy of all the available lands. The construction of this canal may be considered a work of wonderful enterprise, and a notable instance where the wealth of a few is turned into a channel that results in incalculable benefit to every one who settles upon such land, and to the State within whose borders each new comer is made welcome.

About one thousand acres of the lands lying under this canal are in Larimer County, where the State Agricultural College is located. The remainder lies in Weld County, mainly tributary to Greeley, though a town named Eaton (in honor of Hon. B. H. Eaton, who held the contract for the construction of the canal), has been laid out on the line of the Denver Pacific railway, eight miles north of Greeley. The canal is now finished to Lone Tree Valley, a distance of about fifty miles. Already a large number of farms have been opened up. Water rights are sold at one thousand dollars per eighty acres, entitling the holder to fifty-four inches of water.

Wheat is a main crop in the Cache-la-Poudre Valley, though quite a large acreage is in hay and alfalfa. Potatoes are also made a specialty, particularly in the neighborhood of Greeley. About one-third of a million bushels of wheat—nearly one-quarter of the entire crop of the State—were raised in 1881. The average yield was twenty-five bushels to the acre, and the ruling price one dollar and twenty-five cents per bushel. The question whether it pays to raise wheat at this figure has been discussed in a separate chapter.

Heretofore the Valley of the Cache-la-Poudre has been without railroad facilities, save at the two points, Fort Collins and Greeley, where branches of the Union Pacific system tap the valley in crossing. But a road is now in course of construction, following up the entire course of the Cache-la-Poudre Valley into North Park.

CHAPTER VIII.

BIG THOMPSON—LITTLE THOMPSON—ST. VRAIN.

Three years ago, the tourist over the Colorado Central branch of the Union Pacific railway, traversing the place now occupied by the town of Loveland, in Larimer County, saw little else than an uncultivated plain. Now —as by the hand of magic—the scene has changed; a thriving town has been established, broad, fertile fields and pleasant looking homesteads dot the distance for miles around, and, save for a narrow strip of land far above any canal likely to be taken out of the stream, the entire district gives evidence of a prosperous and permanent agricultural section.

The Valley of the Big Thompson is one of the prettiest in the State, as well as being one of the most fertile. Until lately only the bottom lands were in cultivation. The Big Thompson irrigating ditch, the Rist ditch and a number of other small irrigating channels were the only water courses supplying the lands bordering upon the stream. The Rist ditch is especially noticeable from the fact that it is about the largest ditch owned by one individual on the stream, or indeed in the State, covering a farm of nearly three thousand acres in extent, the ownership of which is centered in Mr. George Rist, whose farming operations have been, thus far, more extensive than those of any other one person in Colorado. He has had one thousand acres of wheat in at one time.

The Big Thompson irrigating ditch was built in 1864, covering about one thousand five hundred acres of bottom lands. It is six miles long, and some of the choicest hay lands of the valley lie under it.

Later canal enterprises are putting under water all the lands upon the uplands on both sides of the stream. The Handy Canal is to cover twenty-five thousand acres; has a width of twelve feet, and a length of twenty miles. The water is to be rented at the rate of one dollar and a quarter per inch for the season. The Loudon Canal is an enterprise about completed, which is expected to water ten thousand acres.

Another canal, to become an important factor in the development of the resources of this valley, is the Loveland and Greeley Irrigating Canal, coming out of the stream above Loveland and watering the lands lying on the northern slope of the valley to the amount of thirty thousand acres; then, crossing the Divide between the Big Thompson and the Cache-la-Poudre, running back in a westerly direction, covering at least ten thousand acres on the south side of the last-named stream. It is twenty feet wide on the bottom, and cost forty thousand dollars for a length of thirty-five miles. Work was begun on this in 1881 and water ran in it during the spring of 1882. A large quantity of railroad land under this proposed canal has been secured by contract, and is to be sold to actual settlers upon payments covering a term of years. Water rights are sold at a fixed valuation. There is not likely to be any Government land open for settlement; as soon as a canal is surveyed, there are those waiting to enter claims upon every quarter section likely to be covered by it. While the agricultural development of the lands under it is the main object of the company, it is intended to give a water supply to the towns of Greeley and Evans. Reservoirs one hundred feet above the grade of either town can be formed and a permanent supply of water for household purposes thus secured.

In addition to the foregoing canals, there are eight or ten others, with a capacity for irrigating from three hundred to three thousand acres, so that in all, about one hundred thousand acres are under canals built or projected. That there is a sufficiency of water in the Big Thompson for all this land is not certain, unless a system of reservoirs is established. There is no doubt that the water is all appropriated, and no more canals are likely to be built. Those who select this valley for farms should examine the water supply carefully. But indeed this advice applies everywhere in Colorado. Land is in plenty. The water is the main point for consideration.

The Little Thompson is a branch of the main stream. Previous to the year 1879 this charming little valley had about a score of farmers holding small farms, with ditches of short length, suited to individual wants. About three thousand acres were thus held on fee, of which not over one-third was cropped. But the onward tread of the genius of agricultural development has reached even the borders of this pleasant valley, and though the land to be brought under cultivation is to be watered from the channel of the Big Thompson, it will no less cause prosperity to rest upon the sunny southern slopes. Under the Handy Canal a large acreage has been fenced, and the next few years will effect a wonderful change for the better in the neighborhood of Berthoud, which is the railroad station on the Colorado Central branch of the Union Pacific, and the distributing point for the neighborhood.

The St. Vrain Valley, until lately, has been set down as yielding a larger amount of grain than any valley in Colorado. But it must now yield the honor to its northern neighbor, the Cache-la-Poudre. Still, some fifty thousand acres of fenced farms, on which between two and three hundred farmers are living in neat and comfortable homes, is the pride of Boulder County in particular, and the State at large. The amount of water in the St. Vrain is less than in the Cache-la-Poudre, and a large number of the small ditches used in former years, by those who resided upon the bottom lands, now get but little water at a time when it is most needed. The limit of cultivable land in the valley has been reached, and it is safe to say that no new canals of any size will hereafter be constructed. Those already built, except in very favorable seasons, cannot supply the demand, and the new comer into this valley is cautioned to be sure that there is a certainty of a water supply for land he may purchase, before he closes the bargain for it.

The four largest canals conveying water covering the northern slope of the valley, are the Highland, Supply, Rough and Ready, and Oligarchy, but there are nearly a score of other incorporated canals, covering from six hundred to three thousand acres. The amount of water "claimed" in this valley amounts to seventy thousand inches, to water the same amount, in acres, of land; but the supply in the stream, during its season of greatest volume, is scarcely two-thirds of this amount. The Highland is the largest, flowing eleven thousand inches of water, and covering lands in Weld County as well as the county wherein it heads. The Highland Lake district —a few years ago wild prairie land—is now one of the best cultivated and best watered districts of the State. There are about four thousand acres of arable land in this vicinity, which can hardly be said to belong to the St. Vrain Valley, but which for convenience are grouped with it. The lake from which the district takes its name is an important factor in its prosperity, as in dry seasons a large supply of water can be drawn from this convenient and useful reservoir, so wisely selected and utilized by Messrs. L. C. Mead and C. A. Pound, when, in the year 1872, they became the first settlers upon what was lone prairie land, seven miles from the new colony town of Longmont. But of late years they have had an abundant reward for their foresight, their patience, and their faith.

In the St. Vrain Valley there are more than twenty owners of farms over four hundred acres in extent, about twenty-five owning over three hundred acres, and seventy or eighty whose holdings run from one hundred to two hundred and forty. The remainder of the land is held in eighty-acre tracts, but very few farms as small as forty acres in extent being found in the valley. In ordinary seasons the wheat crop of the valley district is three hundred thousand bushels; corn, fifty thousand; barley, ten thousand; while the hay crop reaches five thousand tons. Amber cane is a specialty. More attention has been paid to its cultivation here than elsewhere in the State. In amber cane the farmers of the future will find a profitable industry.

It is doubtful if many more new farms can be opened here, but those that are taken can be cultivated to a greater extent, and by a more thorough system of farming, be made to yield more valuable returns. The day for loose, heedless farming in Colorado has passed away. A higher cultivation, a closer attention to details, the preservation of material that heretofore has gone to waste, rotation of crops, manuring the soil—these are a few of the subjects that now press their importance upon the minds of farmers for early attention.

Improved farms are held at high figures, especially in the immediate vicinity of Longmont. They command from thirty dollars to fifty dollars per acre, according to the character of the improvements. Therefore only farmers with means are advised to visit this section when looking for a home. There is not an acre of Government or railroad land to be obtained. Under some of the canals no water is supplied, except to those who hold stock in the company. The incorporated canals charge a rental of from one dollar to two dollars per acre each year.

Left Hand Valley lies south of Longmont, about four miles distant, and is cultivated from the point where the stream, which is very small, issues from the canon, to where it empties into the St. Vrain. The soil is very fertile. Those who have settled here are as forehanded as any in the State, and their farms are models of thrift and thorough cultivation. Between thirty and forty farms are opened up, covering in the neighborhood of seven thousand acres of land, of which one-third, perhaps, is cropped to wheat, oats, corn, and potatoes. Considerable barley is grown, while vegetables in large quantities are raised, for which a market is found in the mining districts of Boulder County.

CHAPTER IX.

BOULDER AND CLEAR CREEK VALLEYS.

Boulder Valley, including the section of the country watered by the South Boulder, is an extremely fertile agricultural district, containing, in addition to the arable lands, some of the finest hay meadows in the State. It is well settled, some of the bottom lands having been taken up at a very early period. The Wellman farm, about two miles from the town of Boulder, is said to be the oldest one in the State. The land, all the way down to where the stream empties into the St. Vrain, is fenced and farmed. During the year 1881 at least forty thousand acres were in crops, yielding in the neighborhood of sixty thousand bushels of wheat, in addition to a fair amount of corn, oats, and barley.

Several canals, covering quite a large area of territory, are taken out of Boulder Creek. The Farmer's was one of the first, having been built in 1862. It heads half a mile inside the canon, is seven miles long, and waters from twelve to fifteen hundred acres of fine farming land. The company is a stock one, but it is all owned by those holding and cultivating land under it, and the water is distributed according to the number of shares held, of which there are only one hundred in all. The Beasly Canal is ten feet wide and twelve miles long, is taken out of the stream just east of the town of Boulder, and was built in 1875. It waters some of the land lying on the south side of the St. Vrain, as well as lands in Boulder Valley proper, carrying about two thousand five hundred inches of water. The Chambers Canal is about the same size as the Beasly, and waters nearly as many acres. In addition to the foregoing there are a number of small ditches, not incorporated, taken out in the earlier years of settlement, and covering from one to five hundred acres of choice lands, mainly in hay.

In the upper and lower valleys there are at least fifteen thousand acres under fence. Some few farms are being opened at the extreme eastern end, but it may be said that new comers are not likely to find any lands open to settlement under Government regulations that are likely to be watered. Improved lands are held, if hay lands, at from thirty dollars to fifty dollars per acre, and upland farms for from fifteen dollars to thirty dollars, according to the improvements. There are several large land holders, one at least, who counts his acres by the thousand, and is constantly adding to the area. His farming operations are extensive, cropping under his own management, and by lease to renters.

The hay crop yields quite an income here. There are but few occupying the bottom lands who cut less than a hundred tons annually, and the amount, in the aggregate, is not far from ten thousand tons.

Among the new settlements made in this valley, of late, I may mention a colony of Swedes, numbering, young and old, about five hundred persons, who are farming lands lying north-east of the town of Boulder. These thrifty and energetic people are creating wonderful changes over a large section of country, and their farms are steadily adding to the material wealth of the county they are located in.

There arefewer canals taken out of Boulder Creek, considering its volume of water and the choice lands that lie on eitherside of the main stream and its south branch, than one would suppose, comparing them with the other streams to the north. As a consequence, a scarcity of water is something wholly unknown at present, and may never occur. The soil, however, is equal in fertility to any in the State, and capable of yielding the maximum of crops.

On the South Boulder there are five thousand acres of fenced lands, divided among a score or so of farmers, the largest farm being six hundred acres in extent. Barley, potatoes, amber cane, wheat, corn, oats, and vegetables are raised, finding a ready market in the mountains near at hand. The hay crop is large.

On Coal Creek some twenty farmers are settled, using water mainly taken out of the South Boulder. The Davidson Canal is one of the principal water courses, is twelve miles long, and carries two thousand inches of water. South Boulder and Rock Creek Canal covers quite a strip of country, though its capacity is small, carrying not over two thousand inches of water.

Clear Creek Valley is in Jefferson County. Quite a number of small canals are taken out of the stream, which at one season of its history might have justified the name it bears, but does so no longer, many stamp mills on its banks at the upper end using and fouling the water.

On the north side the Arapahoe Canal covers fifteen thousand acres. The Church Canal, running above this, is sixteen miles long, and waters a like number of acres. The Reno and Jackson Canal is eight miles long, is owned mainly by farmers using the water, and covers land in the neighborhood of Arvada, midway between Golden and Denver.

On the south side, the Agricultural Canal runs on the Divide between Bear and Clear Creeks, covering both slopes, and watering at least fifteen thousand acres of choice land. Table Mountain Canal is one of the oldest in the State. The line of this canal runs east from Table Mountain to the county line, and then crossing it, covers a large section of Arapahoe County. It is twenty-five miles long, and from eight to fifteen feet wide, and will water ten thousand acres of land, though only about five thousand inches are annually sold. The "inch" of this company is a generous one, giving more water than is measured out by other canal companies.

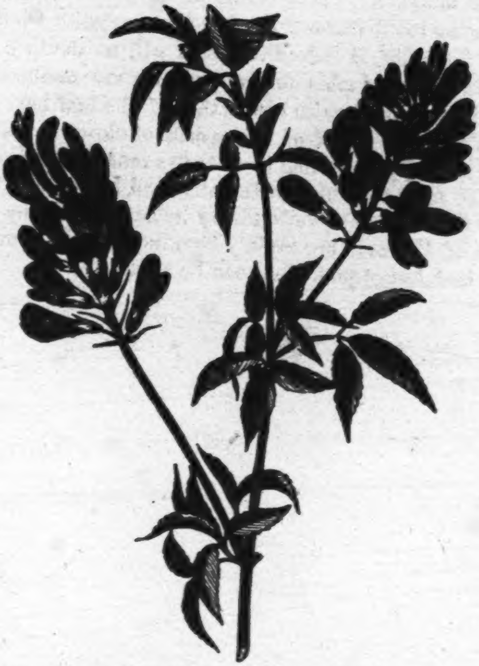
In all these, except the one watering the Arvada district, the water is sold to those who use it at from one dollar and a half to two dollars per inch, it being understood that an inch, in ordinary seasons, is equal to the needs of an acre of land.

Some of the oldest settled farms in Colorado are in this valley. The meadow lands yield abundantly of excellent hay. Until the last year or two there was but little uncultivated land under the canals, but their extension has opened to cultivation a large section of what was prairie land, and of but little value.

Out of Bear Creek, an affluent of Clear Creek, two canals of considerable size are taken, one on each side. The Lewis and Arnett is a chartered company, covering bottom lands. A strip of country about seven miles long is under water. These are mainly hay lands. On the south side of the stream the Harriman Canal runs into a large lake, and, issuing from it, flows toward Littleton, watering a fine area of land. From the mouth of the Platte Canon, running down on the west line of Jefferson County, there are several thousand acres of agricultural land, lying north-west of Acequia, on the Denver and Rio Grande railway.

These farming, meadow, and garden lands of Jefferson County are becoming very valuable on account of their vicinity to the Capital of the State. It is not likely that any more large canals will be taken out of Clear Creek, though those already constructed are capable of being enlarged and extended, and the water supply will warrant it. The water is full of mineral sediment from being used by the many mills located along its banks in and above Golden.

Alfalfa is raised to a large extent here, as well as in the neighborhood of Greeley. For many years Mr. L. K. Perrin, one of the first farmers in the State, has



LUCERNE, OR ALFALFA (*Medicago sativa*).

grown this valuable fodder to considerable profit. Others, stimulated by the success attending his efforts, have seeded from five to fifty acres. Mr. J. B. Walker, located three miles from Denver, has over one hundred acres. It may be said here, that, while at this time there are not over three thousand acres of alfalfa in the State, the time is not distant when it will be the main forage crop of the country. There is much that can be said in its favor, especially where it can be grown near to large markets. There seems to be some question as to its being baled successfully for transportation; but even this difficulty, if indeed it exists, will no doubt be overcome. Its valuable forage qualities are unquestioned, while its market price equals that of the best hay.

When once a field of this species of clover is well set it will annually yield from three to five tons of nutritious hay to the acre, on which both cattle and horses thrive well. For milch cows there is no hay its equal, and the dairymen of Colorado are rapidly learning to look upon it as the best forage plant that can be raised.

CHAPTER X.

SOUTH PLATTE VALLEY.

The valley of the South Platte, from where it issues from the canon to the point where it receives the waters of the Cache-la-Poudre, five miles below Evans, is settled by a thrifty and enterprising farming community, mainly occupying a strip of country two miles or so wide, on each side of the stream.

In the early days of Colorado, only the lands bordering immediately on the bed of the streams were supposed to be valuable. These were eagerly taken up and occupied as ranches, and to secure the control of the range stretching outward from the water, for cattle. This resulted in building a large number of small ditches, carrying a limited supply of water, and capable of irrigating the lands designed for hay meadows along the bottoms of the valley, and for the cultivation of a few acres devoted to the cereals and to vegetables. As time passed on, and it began to be demonstrated that there was also a value to the uplands, for agricultural and other purposes, these lands, especially for miles west and north of Denver, were obtained in one way and another by speculators, and held for an advance in prices. New and large canal projects were broached and charters obtained, but in most cases no further steps were taken to utilize the large body of land lying idle in the immediate vicinity of Denver.

As the colony system grew in favor, by the success of the one established at Greeley, several were projected, having the South Platte as the source of water supply. The towns of Platteville, Evans, Corona, and others, might be named. From these laudable enterprises came coöperative canals that have materially enlarged the amount of land lying under water, especially as the course of the river is followed down toward Greeley and

Evans. A great deal of this land is still unproductive, and the supply of the cereals could be materially increased by the utilization of the lands that already lie under completed canals, and only need, perhaps, new life infused into their management to make them important elements in the advancement of the agricultural resources of Colorado. Not one quarter of the arable land to which water can be applied in the valley of the South Platte has even had the sod turned upon it. Much of it, probably, is owned by parties who are not farmers, holding it as a safe and sure-to-be profitable investment. But the retardation of an important industry thereby ensues, turning settlement into other channels where land is easier to be had and water fully as abundant. It is probable that during the season of 1881, not more than one hundred and twenty-five thousand bushels of wheat, forty thousand bushels of oats, fifty thousand bushels of corn, and a proportionate amount of other crops were raised in the region stretching from Platte Canon to Evans, a distance of seventy-five miles.

A very large and flourishing section of farming land lies in the immediate vicinity of Evans, founded by a St. Louis Western Colony in 1873. Four canals of large size water the country south and east of the town. The Colony Canal, as it is called, is twenty feet wide and fifteen miles long. The Independent Canal is fifteen feet wide and twelve miles long. The Union Canal is twenty feet wide and fifteen miles long. The Latham Canal is twelve feet wide and ten miles long. These canals cover an area of seventy-five thousand acres of the very best wheat lands, of which but a very small proportion is in cultivation, so that there are good opportunities for new comers under these canals. A large amount of hay is cut between Platteville and Evans. Farm lands, unimproved, average fifteen dollars per acre; where there are improvements, from fifteen dollars to thirty-five dollars. Not over ten thousand acres are cultivated, so that there is a good field here in this well located section, for farmers to select lands from. The canals are substantial, the water tax reasonable, averaging one dollar per inch.

From Greeley to Julesburgh, now known as Denver Junction, on the short line of the Union Pacific to Colorado, up to the spring of 1882, but little farming was carried on. Prime valley lands, abundance of water, excellent natural hay meadows, stretch along a distance of two hundred miles, with but here and there an occupied ranche. Distance from market has been one objection to the settlement of these lands, but the fact that the State owns the larger part of the lands susceptible of irrigation has been the principal reason why they have lain idle.

Now that a branch line of the Union Pacific railway enters the valley at the lower end and follows it up to Denver, and the State Land Board has wisely decided to sell part of the lands owned in this vicinity, there has been an immediate and favorable change. During the last few years, in anticipation of railway facilities, settlements have been made at favorable points. These have had a hard struggle for existence; some of them were entirely abandoned. But a brighter day is dawning for the lower Platte Valley, and it may be expected that in the course of a few years, the valley will be dotted with thriving towns, and prosperous farms, under extensive canals, will be found along the line of the new road. Already three canal companies have been organized to construct canals. One on the north side of the Platte, in the vicinity of Fremont's Orchard, thirty-five miles east of Greeley, named the Weldon Valley Canal, is twenty miles long, with a width, for the first ten miles, of twenty-five feet, and will water at least fifteen thousand acres of land. Some of this land, to be thus opened for settlement, is State land, which can be leased or bought on favorable terms. But little if any of it is open to homestead and preëmption.

Another, the Pawnee Canal, eighteen miles long, covering State land mainly, is taken out of the Platte River, near Buffalo, a station on the Union Pacific Short Line from Denver to Omaha. Its width for the first nine miles is thirty feet; after which it is reduced until the last few miles it is fifteen feet wide. It will water forty thousand acres of choice land, and reaches to the town of Sterling. The company constructing it have purchased State lands amounting to about twenty thousand acres; these will be partly cultivated by the stockholders, but some of the land will eventually be placed on the market. The lands under the canal still owned by the State can be leased on easy terms.

The third canal is known as the Beaver, and waters land on the south side of the Platte. It heads in the vicinity of old Fort Morgan, and when completed will be fully forty miles long. The first eighteen miles the width is thirty-seven feet. At least fifty thousand acres will be covered by this canal, mainly State lands, of which one-half is owned by the company constructing the canal; the balance is held in reserve by the State, but can be leased. This fine body of land lies along the line of the Colorado Branch of the Burlington and Missouri railway, and will have two stations upon it; the first named Brush, eighty-eight miles from Denver; the other named Akron, one hundred and eleven miles from Denver. This is one of the points selected by the Artesian Well Commission to locate an experimental well. The first twenty miles of this canal are completed; the balance will be finished in 1883.

At Sterling, sixty miles east of Greeley, there is a settlement of a score or more of farmers who have a fine area of somewhat sandy land under cultivation. The ditch covers several thousand acres. At South Platte

Station there is another settlement of about a score of farmers who have built a canal and will farm next year.

As the road leaves Denver Junction on its way up the valley, there is a large quantity of railroad land soon to be placed in the market. Here too can be found public lands, and a colony organization could secure as fine a body of agricultural land as could be desired. This inviting field will, no doubt, soon be occupied. Hundreds of farmers will seek homes in this section.

Closely identified with the agricultural future of the South Platte Valley is the construction (now going on) of the Platte Land Company's Canal and branches, which are to water the immense area of half a million acres, at least, lying east and north of Denver. These lands, though in the immediate vicinity of Denver, with its large market and its railroad connections with every section of the State, have lain idle through all these years for want of irrigating facilities equal to the needs of so large an area. Millions of inches of water have run unappropriated down the current of this river that might have been utilized, and made to conserve the interests of the farmers of the country at large. By a system of lakes and reservoirs, water flowing at seasons when not needed, could have been stored in fabulous quantities, and held for use when moisture was most needed for growing crops.

But such an enterprise was one in which few, if any, individuals could engage, and not many corporations would incline a favorable ear to. Schemes for running the water of this river over the arid plains along the line of the Kansas Pacific railway east of Denver, had been broached from time to time, and numerous examinations of the practicability and cost of carrying out such an enterprise, have been made by eminent engineers from abroad as well as at home, and reported upon favorably. But, when the time came to seek for funds necessary to carry on such a work, there did not appear to be sufficient capital in Colorado willing to undertake it.

Since the State has taken so marked a step toward a prosperous and permanent growth, and is likely to become one of the wealthiest States in the Union, it has attracted the attention of Eastern and of English capitalists, who have been on the look out for the safe investment of large sums of money. Witness the amount put into the construction of the Larimer and Weld County Canal, to which reference has been made, and which is creating homes for thousands of industrious farmers, and adding millions to the taxable wealth of the State. So well satisfied are these gentlemen who have invested heavily, that this enterprise is likely to return good interest for the amount invested, that any new project is sure to receive favorable regard when presented for consideration. Hence, when this South Platte enterprise was once more urged upon capitalists who "look a long way into the future" the possibility of success became surer.

In one of his visits to Colorado, the eastern owner saw the necessity of arrangements with some parties to develop the lands belonging to the Denver Pacific and Union Pacific railways. His practical ownership of these lands made it an object for him to place them upon the market in such a condition, that a quarter section or more could be obtained by men who desired to till these acres, who would thereby build up the country through which his lines of railway passed. He presented the subject to Mr. James Duff, the General Manager of the Colorado Mortgage and Investment Company of London, whose office was at Denver, and after a careful review of the matter, an agreement was entered into by which a canal was to be constructed whose size would make it the largest in the country, and which would render valuable hundreds of thousands of acres of apparently arid lands. A company with ample capital was at once formed in London to carry out this agreement. The services of Mr. E. S. Nettleton, an engineer, well known in Colorado as having been connected with the construction of its largest irrigating canals, were secured. Mr. Nettleton adopted what has been called the High Line route as the one best calculated to secure good results, although his plans will require the expenditure of a greater amount of money than some of the routes recommended by other engineers would have done. But as this work is one which will probably remain in existence hundreds of years, and one on which the prosperity of thousands of farmers will ultimately depend, the matter of a few thousand dollars more or less was not deemed worthy of serious attention.

Some account of this, the greatest irrigation work in Colorado, will be of interest, showing the magnitude of the system proposed, and the permanent character of its construction. It will be seen that it is being built "not for a day, but for all time."

The South Platte River is tapped about one and a half miles inside of the entrance to Platte Canon, about twenty miles from Denver. From that point the water is carried through a tunnel, bored through the solid rock, into a flume, and thence into the principal channel.

Reaching the plains the course of the stream is easterly and northerly. It crosses Plum Creek by a flume nine hundred feet in length, and a similar one will be required when it crosses Cherry Creek. Wherever creeks are to be crossed there will be fluming of the most substantial character. The distance to Cherry Creek is forty-four miles. The total length to Box Elder Creek is eighty miles. Laterals and branches of at least eighty miles more in length are to be built, so that the entire canal system will be one hundred and sixty miles long. At a certain point on the Divide between Cherry Creek and Sand Creek, the canal will bifurcate, a branch extending in a northerly direction to water the lands belonging to the company along the line of the Denver Pacific railway, while the main canal will follow the eastern line toward Box Elder on the Kansas Pacific road. The work of construction is well under way, and water ran to Cherry Creek during the season of 1882.

The following facts, which I have collated regarding this Canal, are both trustworthy and interesting:

The ditch, it is estimated, will cover—or rather include within its line—an area of over eight hundred thousand acres. Its capacity for irrigation will not, to begin with, reach over two hundred thousand acres; that is as water can at present be used for that purpose in Colorado. This naturally leads to its being pointed out that water at present in Colorado is not very economically used for irrigating purposes. This is shown by a comparison of acreage which can be irrigated by a certain body of water in this country, and the extent of land which this same body of water will irrigate in countries where the system of irrigation has been an established fact for years. It is also a well known fact that Sir Arthur Cotton, Director-General of Irrigation works in India, to whom several features and points in connection with the building of irrigation works in Colorado were recently submitted, stated that the same quantity of water in India would irrigate an extent of land three or four times the extent at present irrigated by the same quantity in Colorado. The logical outcome of such a conclusion as this can alone be, that the longer a certain area of land is under the system of irrigation, the less quantity of water is required to do the irrigation. This being so, it is apparent that the longer irrigation is continued the less the quantity of water required to effect the same purpose, and consequently the greater the area which can be benefited by the irrigating ditch.

The benefits to accrue from the completion and successful operation of a canal of so great magnitude, can hardly be estimated. Says a writer already quoted from: In the first place it is a well-known fact that Agriculture in Colorado is comparatively easy, provided the supply of water for irrigation purposes be secure and steady. The land is generally of a quite level or gently undulating character, and consequently the labor of irrigation is easy and the expense light. After once having water over the land in good shape, a pair of good horses and a plow can turn the virgin soil at the rate of about an acre a day. Agriculture in Colorado will always be profitable, and for various reasons. The extension and development of canals and the judicious cultivation of trees may have a beneficial effect upon the aridity of the atmosphere. The demand for home produce at the present moment is very considerable, and the prices to be obtained correspondingly high, and if the extraordinary development in the mining industry of the State continues, which there is every reason to believe it will, this large demand and high prices will follow as a necessary consequence.

The cost of this Canal, the most extensive irrigating works in the State, will be nearly three million dollars. For the benefit of readers of this volume who may contemplate Colorado as a home, it may not be amiss to state that, reaching Denver, they will find at the headquarters of the Platte Land Company such information as they may desire. There can be no question as to the ultimate value of these lands. Specimens of the soil within the limits of this system of irrigation have been analyzed (see page 108), and the result proves that it is so rich in natural phosphates and in the fertilizing elements of decomposed plants, as to insure a continuous and abundant yield of wheat crops for an indefinite number of years. It is capable of producing all the cereals and vegetables indigenous to the Temperate Zone. The closeness of these lands to the principal market and shipping point in the State, gives them an

ANALYSES OF COLORADO SOILS WITH THOSE OF OTHER COUNTRIES.

	*COLORADO SOILS, BY T. JAMIESON, ABERDEEN.								California Soils, by T. Jamieson, Aberdeen.		Manitoba Soil, by V. Emmerling, Kiel.	Roumanian Black Earth.	Russian Black Earth.
	Larimer County.		Arapahoe County.					Pueblo County.	From near Lake Tulare.			"Farming in Roumania," from *London Times.*	From *London Times.*
	Adobe.	*Upland Clay Loam.*	*Platte Land Co.'s Land.* Samp'd 1879.	*Clay Loam.* S 29 T 3 S 66 W.	*Sandy Clay Loam from Sand Creek.* S 33 T 3 S 66 W.		*Sandy.* S 21 T 3 S 66 W. Surface and Subsoil	Osage Avenue.					
					Surface	Subsoil			Soil.	Subsoil			
Volatile Matter....	2.49	1.31	10.10	3.90	4.23	4.18	1.87	6.83	1.86	1.23	....	Water 4.90 8.45	Water 6.05 7.47
Matter Soluble in Strong Acid...	11.40	5.33	2.58	3.82	3.98	4.30	2.08	3.11	3.25	1.94	....	5.02	5.23
Matter Insol. in Strong Acid...	86.11	93.36	87.32	92.28	91.79	91.52	96.05	90.06	94.89	96.83	....	81.91	89.45
	100.00	100.00	100.00	100 00	100.00	100 00	100.00	100.00	100.00	100.00	....	100.28	101.19
The Vol. Matter contd. Nitrogen	—.14	—.13	--.07	—.088	—.063	—.022	—.006	—.10	—.08	—.06	—.436	—.35	—.37
The Sol. portion contained—													
Lime...........	3.27	—.26	—.55	—.17	—.14	—.43	—.16	—.38	— 17	—.18	—.092	—.70	—.59
Magnesia........	—.54	—.44	—.13	—.25	—.29	—.57	—.16	—.28	—.25	—.13	—.016	—.26	—.05
Potash...........	—.59	—.43	—.23	—.13	—.11	—.10	—.06	—.22	—.26	—.14	—.228	—.20	—.25
Iron-Oxide.......	1.04	1.25	{ 1.28	3.14	3.35	—.08	1.61	1.70	2.43	1.17	....	3.53	3.04
Alumina.........	2.39	1.30											
Phorphor. Acid (Anhydride).	—.12	—.10	—.11	—.13	—.09	—.12	—.09	—.14	—.11	—.04	—.069	—.10	—.15
Sulph. Acid do..	—.23	—.20	—.11	Trace.	—.00	—.00	—.00	—.18	—.58	—.38	....	—.05	... .
Nitric Acid do...	Trace.	Trace	....	....	....	....	....	....	Trace.	Trace.	....	....	....
Car. Acid do....	1.89	—.20	....	....	....	....	....	....	Trace.	Trace.	....	—.02	—.33
Chlorine.......	— 10	—.08	—.17	....	....	....	....	—.17	—.02	—.01	....	—.01	....
Soda, Carbon, Matter, &c..	2.43	1.22	....	....	....	....	....	....	1.18	1.06	—.033	—.15	—.29
	11.40	5.33	2.58	3.82	3.98	1.30	2.08	3.11	5.03	3.11	....	5.02	5.23

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* Prof. Jamieson reports as follows: The distinctive characteristics of these soils are—the large proportion of Potash; the form in which the Phosphates exist; nearly the whole is Soluble in weak Acid, and hence can be readily assimilated by plants; the low percentage of Organic Matter, and the high proportion of Nitrogen the Organic Matter contains; the large proportion of Lime in the Adobe soil; generally, the ready available form of all the constituents.

additional value the moment the crop begins to ripen to the harvest. The owner of a quarter section ought in a few years to become independent, if he has in him any of the thrift that characterizes the industrious man.

For those whose scanty means impel a careful consideration of location, easy terms of payment are provided, by which land and water can be secured upon annual payments. The needs of all classes are met, and the poor and rich alike can find homes here, if they will.

It requires no great stretch of the imagination to look forward a few years and anticipate the panorama that will then stretch out over the hitherto arid wastes of Eastern Colorado. Wherever the limpid water is made to run, there will spring up a plant, a shrub, a tree; wherever the shining current flows, a field of grain will lift its emerald tassels to the sunlight, eventually to change into golden grain. Farms, fields, and gardens will flourish under the beneficent touch of the Spirit of the Stream. Fenced farms, smiling landscapes, and cosy homes will spring up where of late sheep and cattle grazed in the continuous silence, and the busy hum of civilization will be heard in every direction.

"I see them come from their homes afar
Firm in the faith of the Western star
That led them to these slopes.
And the young and the old, the fair and the bold,
And the feeble out of the old home-fold
Are full of their new-born hopes.

"Fair are the homes that round them rise
And sweet and bright are the happy eyes
That greet each coming day;
For the old fades out before the new
And the roses grow where the cactus grew
On the prairie lands away.

"And the years shall come and the years shall go,
And the river's current still will flow
By the city of the plain,
And spires will point and towers will rise
And the mill wheel whiz where the Indian's cries
Will never be heard again."

CHAPTER XI.

SOUTHERN COLORADO.

The first stream of any size south of the Divide is the Fontaine-qui-Bouille. A canal from this, constructed in 1872, waters the garden and fruit lands about the City of Colorado Springs. Below this beautiful and thriving place lies a pleasant valley, almost in a state of neglect, running down to its junction with the Arkansas River, near Pueblo. It is generally supposed that there is a lack of water sufficient to convert these waste places into golden fields of grain; this is partly true. Five thousand acres, perhaps, could be brought under cutlivation in this charming valley, with a home market at Colorado Springs or Pueblo, that would take all that could be raised from these now idle farms. A fair volume of water runs waste, that could be utilized and made the medium through which grain could ripen in scores of wheat fields. Not one-tenth part of the land is at present cropped. A few enterprising farmers could find pleasant homes here. This is the only stream of any account in El Paso County, hence agriculture, thus far, has not engrossed the attention of its citizens. Late reports give about three hundred farms in the entire county. The sheep interest, however, is very large, and the eastern half of the county is dotted with ranges where sheep thrive. The hay crop of the county, in favorable seasons, reaches fully ten thousand tons; a large area of upland is cut over without being irrigated. Some attention is paid to alfalfa.

In the Arkansas Valley, though vast tracts of fertile lands lie on either side of a river flowing an immense body of water, there is but little agricultural development. From Canon City east of Pueblo, a goodly part of the valley lands are cultivated, but eastward, the agriculture of the valley is in the future. In 1874 an extensive canal was built at a cost of over one hundred thousand dollars, to water the plains south and east of Pueblo, but it did not prove a success. Probably the nature of the soil had something to do with it. It was sandy and frequent wash-outs occurred, while the canal itself soon filled up with sand deposited by the flowing current. The greater length of the canal, at its lower end, has been abandoned, though under the first part of it a few farmers are settled, using the water at a fixed annual rental.

Stock interests predominate in Pueblo County, as indeed it will be found they do in all the counties and valleys of the southern part of the State. Still this is not because there are no lands suitable for farming operations. The State assessment shows over twenty thousand acres of farming land proper, valued at nearly two hundred thousand dollars. Meadow lands are extensive and are exceedingly profitable. But the pasture lands in ownership are ten times the amount of farming and meadow lands combined. Pasture land has an assessed valuation of one dollar and a quarter per acre, meadow land seven dollars and a half, and farming land eight dollars and a half. With seventy thousand sheep, horses, and cattle, valued at four hundred and fifty thousand dollars, with the possibility that the actual value will reach one million dollars, it will be seen that the agricultural industries of the Arkansas Valley, in this county, are not very large.

The production of grain is indeed small. Fifty thousand bushels of wheat is an outside limit for a district that could easily raise ten times that amount. It is said that the Arkansas Valley is generally too hot to raise wheat with success. This may be true, but it is by no means certain, and should not be accepted as fact without further investigation. There is a lack of irrigating facilities on a large scale, though quite a number of small canals have been taken out. These, however, mainly water meadow lands and do not extend far out upon the uplands. In ordinary seasons a large amount of hay is cut in the valley. While there may be a question as to wheat, there can be none about corn, amber cane, and vegetables of all kinds. The valley, properly and systematically irrigated, can supply the entire State with syrup and sugar. The water is ample in volume, the valley lands warm and sunny, the soil a sandy loam eminently adapted to cane culture, and millions of gallons of syrup and pounds of sugar ought to enter into the product of the valley. But will they? Not as at present developed. A new class of settlers must come in, bringing with them advanced ideas of progress and expansion, in the line of agriculture, and a fixed purpose to succeed. There are grand opportunities for colonies in this part of Colorado. Towns could be founded and surrounded with thriving farming communities. The Atchison, Topeka and Santa Fè railway runs through the valley, giving a western home market and a south-westerly, going down to Santa Fè.

After leaving Pueblo County, the course of the Arkansas is directly east through the entire length of Bent County; but as concerns this part of the valley it is something like a Samson bound by the withes of a Delilah, the persuasive damsel coming, in this instance, in the shape of a cattle grower. As an old resident of the county, when questioned as to crops, expressively put it "You may set down its agricultural products in as many figures as you please, but use ciphers only."

Yet this state of affairs is not brought about by the absence of water or of arable land. A noble river runs unfettered by, with an abundant volume of water entirely unappropriated, and so not hampered by any priority of right as to the possession and use. Wide table lands—capable of producing corn, oats, amber cane, potatoes, and all kinds of vegetables—with gentle undulations slope up from each side of the river, at an altitude of about four thousand feet above the level of the sea, more promising than can be found in valleys having a higher altitude and a colder soil, such as prevails in Northern Colorado.

When it is said that, at present, the Arkansas Valley through Bent County is given over to the stock growers, its situation is told in a sentence. Three or four men virtually own the county. One man on the Purgatoire, a tributary of the Arkansas, owns sixty-five miles of the river front; another, on the main stream, owns twenty-five thousand acres, stretching twenty miles on each side; others own strips of varying size, thus leaving little room for an interest that directly clashes with the possession of so much soil controlling the water volume, to expand and prosper.

At present hay is the principal crop of the valley. From fifteen to twenty thousand tons are cut yearly. At Rocky Ford there is a canal of large dimensions, taken out of the south bank, which is well constructed and probably the best in the county. It is twelve feet wide, thirteen miles long, and covers over twelve thousand acres of land mainly given up to meadow, and all under fence. Beyond Rocky Ford, nothing of special agricultural interest is to be found until West Las Animas, the county town, is reached. Here there is a fine canal, lying idle on account of litigation about the choice farming lands under it. Years will elapse before the case is settled, so that the canal is useless, the lands lie idle; brown and barren prairie land that might be green and gold in the sunlight if open to settlement.

Potatoes seem to thrive well in this section, and potato ground, wherever found, is very valuable. There are some locations, back from the river front, where colonies could be settled to great advantage, and canals constructed to water large bodies of choice land. Many of these sections are open to public entry. The railroad facilities are good, so that stations could be established, and communication had direct with Eastern and Western markets.

The weather record at this comparatively low altitude (compared with the farming sections of Northern Colorado) is of some interest, and the following memoranda, by a careful recorder, are given as reliable.

MEMORANDA.

1875.

Snow Storms.—January 4th, 12th, 21st, 27th, 29th. February 23d, 24th. March 1st, 14th, 18th. April 7th, 10th, 24th, 25th. September 21st. November 4th. Total, 16.

Below Zero.—January 7th 2°, 8th 8°, 9th 18°, 10th 4°, 11th 4°, 13th 28°, 14th 22°, 15th 4°, 16th 4°, 17th 6°, 18th 6°, 22nd 8°. February 3d 4°. November 3d 4°. Total, 14.

1876.

Snow Storms.—February 26th. March 10th, 11th, 15th, 19th, 31st. April 12th. December 22nd, 23d, 30th, 31st. Total, 11.

Below Zero.—January 27th 2°. December 24th 28°, 25th 8°, 29th 12°. Total, 4.

1877.

Snow Storms.—January 7th, 11th, 18th, 22nd. February 5th, 18th. March 1st, 9th, 23d, 26th. October 15th. December 3d. Total, 12.

Below Zero.—January 8th 6°, 23d 15°, 24th 4°. November 29th 2°, 30th 4°. December 4th 4°, 5th 4°, 6th 4°, 7th 2°. Total, 9.

1878.

Snow Storms.—January 12th. February 2nd. March 8th, 28th, 29th. December 12th, 13th, 17th, 25th. Total, 9.

Below Zero.—December 25th 3°, 26th 8°, 27th 3°, 29th 6°. Total, 4.

1879.

Snow Storms.—January 7th, 28th. February 4th, 15th, 17th. November 27th. December 4th, 17th, 29th. Total, 9.

Below Zero.—January 3d 4°, 6th 10°, 9th 10°, 11th 8°, 16th 4°, 18th 4°. December 24th 12°, 25th 10°. Total, 8.

1880.

Snow Storms.—February 8th, 27th. March 12th, 15th, 20th. April 7th. October 11th, 14th, 15th, 30th. November 4th, 11th, 15th, 16th, 20th. December 16th, 19th, 28th. Total, 18.

Below Zero.—March 10th 5°. November 17th 1°, 18th 12°, 20th 4°, 22nd 2°, 23d 2°, 25th 8°, 26th 8°, 29th 4°. Total, 9.

The frequent snow storms noticed in March give sufficient moisture for the germination of grain. They are seldom severe enough to do any injury.

The Huerfano and Cucharas are the two principal streams coursing through the counties of the same name, and emptying into the Arkansas. The valley lands of each are fair and attractive, but are given up almost wholly to the occupation of Mexicans, whose little flocks of sheep may be found at intervals along the streams. Not over twenty-five thousand acres are returned by the County Assessors as farming land. A great deal of corn is raised, more attention being given to its cultivation than to wheat. La Veta, Cucharas, and Walsenburg, are the principal towns. The Denver and Rio Grande railway traverses each county from east to west, as well as from north to south, giving an outlet in every direction to produce which could be raised in large quantities and of the finest quality, did but Yankee thrift or Western persistence pervade the attractive country lying so pleasantly under the shadows of the Spanish Peaks. When the new civilization that is to replace the old, reaches these beautiful valleys, and the bright and sparkling water that flows down these streams, to mingle at last with the volume of the Arkansas, are utilized to their fullest extent, probably fifty thousand acres of fertile soil can be made to bring forth abundant returns to the fortunate farmers who are yet to choose homes here.

East of the towns of Trinidad and El Moro, the first on the line of the Atchison, Topeka and Santa Fé, and the last one of the terminal points of the Denver and Rio Grande railway, is the Purgatoire Valley. Its head is in the mountain district west of Trinidad, and from its head to its confluence with the Arkansas, a length of seventy miles, it has a varied elevation, from six thousand nine hundred down to five thousand three hundred and ten feet. The valley, from its head to Trinidad, is all under cultivation, but almost entirely by Mexicans, who have a few acres of land, ranging from ten up to a hundred, on which they raise wheat principally. The average width of the valley, to this point, is not more than half a mile, and all the acequias, as the ditches are called, when we reach the section of country where the Mexican element predominates, are of small size, seldom watering more than three or four farms. This is owing to the rapid fall of the stream, as well as to the indisposition of these rude, uncultivated husbandmen to avail themselves of coöperation in the construction of larger canals.

Down the valley, east from Trinidad, stretches a country averaging a mile in width (and which, fifteen miles east of the town, extends two and three miles), of excellent soil, well adapted to grain culture, more or less occupied by American farmers, who, on one-quarter of the land tilled by Mexicans, and with the use of one-half the water, raise more wheat to the acre, and at less expense. Four canals, from two to eight feet wide, and four or five miles long, water a considerable area of land on the upland proper, which is not yet under plow, but could be made to yield generously.

Here is a strip of country, therefore, one hundred miles long, and averaging two miles in width, taking both sides of the stream, capable of cultivation, provided the water is sure. Over one hundred thousand acres of land is a vast scope of country, and it is doubtful if all of it could be watered from the stream. If economically used, it might be sufficient. The prospect for the future is good. There is no better portion of the State worthy of the close investigation of new comers.

There are smaller valleys, in which streams that are somewhat unreliable in their volume of water, flow as tributaries into the Purgatoire. They are the Apishpa, fifty miles long; the San Francisco, twenty-five miles long, and the Trinchera, about fifteen miles in length. These valleys are narrow, and only in the upper part can farming be carried on, on account of the uncertainty of the water supply. The three valleys named produce one-fifth of the grain yield of the county.

It is to be remembered that at least three-fourths of the farming produce is raised by Mexicans, who are three in number to one of the Americans. Their method of raising wheat is slovenly, and without signs of thrift, while the means employed to thresh, using goats and oxen for that purpose, are not conducive to a full crop, or a clean one. Yet despite these drawbacks, Las Animas County, in which these valleys lie, shows commendable progress in agriculture. The last year's record foots up one hundred thousand bushels of wheat, forty thousand bushels of potatoes, besides small quantities of garden stuff.

Slowly but surely the Mexican element is being eliminated, and the more shiftless of this class pass to the South. A thrifty American element is taking their place, and it will not be many years before a remarkable improvement will be observed in the valley and upland farms in this favored locality.

In consequence of the careless method of threshing, the flour made here does not command a good price in the market, and the better class of people do not use it. It is consumed by Mexicans, or shipped South. The average yield is thirty bushels. But little corn is raised, the altitude being high, from five thousand to seven thousand feet above the sea level. It is said that the soil is not adapted to the culture of corn, but I am inclined to think that the season is too short for it. The crops generally are late, both in sowing and reaping, the one being in April and the other in September, while snow has been known to fall in June.

Near the head of the Purgatoire lies the picturesque Stonewall Valley, which is inhabited solely by Americans. Here agriculture is carried on in a more varied form. Grains give place almost wholly to vegetables. The potato crop is large. From five to twenty acres are put in by each farmer. The quantity and quality of the yield cannot be surpassed in the State. The yield, with the most careless treatment, reaches fifteen thousand pounds to the acre, and in some instances exceeds it.

At present the cattle and sheep interests in these valleys are large. If the agricultural resources were developed with as much vim and vigor as is displayed in these other pursuits, the county would take a vast stride in advance of its present status. It is probable that as the country becomes more thickly populated, the great grazing ranges will become reduced in size, fenced farms will become more frequent, and the "Valley of the Spirits," as it is sometimes called, be gradually filled with thriving farms. Many farms, well tilled, are better for the State than a few cattle ranges, well filled.

CHAPTER XII.

SAN LUIS PARK.

An important factor in the future of agricultural progress in Colorado, is the park just named, lying between the Sangre de Christo range and the main system of the Rocky Mountains, and embracing in its borders a section of country from forty to seventy miles wide, and two hundred and fifty miles long. From a geological point of view, the park is one to which great interest attaches, as the opinion prevails that at one time it was an inland sea; the existence of which seems to be a recognized fact from numerous indubitable evidences. Henry T. Williams, author of a Guide to Colorado, published a few years ago, said of it, that "portions of the valley are very rich and arable, notably the minor valleys along the small streams, and along the foot of the mountains. The climate is mild, so that the temperature is higher than in other portions of the State, and, with the exception of corn, all the cereals and vegetables thrive and mature. But grazing is the principal industry, the valleys and surrounding slopes affording rich pasturage." So, ten or twelve years ago, it was said of a large portion of Northern Colorado, that it was a good grazing country, which would be its principal industry. But a change has taken place. The large herds of cattle that once roamed at will, over the wide stretch of country lying north of the Cache-la-Poudre and the Platte Rivers, have been withdrawn, mainly, to other fields, and the footsteps of the agriculturist fall where once only the hoof-prints of cattle were seen. This change of affairs is due to the rapid and continuous influx of people who have come to Colorado to found homes therein; thus, occupying the land and cultivating it, a higher civilization is reached, the State greatly benefited, and the future of its citizens guaranteed, as far as the benefits to be derived from a prosperous state of society are concerned.

And within the coming decade the same beneficial change will take place in Southern Colorado. Heretofore its agricultural resources have been overlooked, or vastly underestimated. Its producing capabilities are practically inexhaustible. As mining increases, agriculture will keep pace with it. The arable soil of this region is capable of producing food for an immense population. At the present time the live stock and sheep interests are far in the ascendant, and this is one cause for the slow advance of farming south of the Divide. But what has proven to be inevitable in the North, will yet be found to be like the inexorable finger of fate in the South, and where now parks, valleys, and uplands are given up to sheep, gradually the thrifty farmer, with his houses, canals, barns, and fences, will encroach, and waving fields of grain will be lifted to the sunlight and ripen to the abundant harvest.

San Luis Park lies in the counties of Sagauche, Costilla, Rio Grande, and Conejos. More than twenty streams run through it, capable of irrigating the greater portion of the land, while the Rio Grande del Norte runs through its entire length, with an inexhaustible supply of water.

There are two hundred thousand acres of land bordering on the Rio Grande that are capable of irrigation, and would produce a most excellent quality of wheat and other grains in great abundance. The average yield per acre, taken from actual figures, kept by five different farmers in this county, leads to the inference that the yield, if anything, exceeds the average in the northern part of the State. I give the statements as forwarded to me by the actual cultivators, having full confidence in their accuracy:

	Wheat.	*Oats.*	*Potatoes.*	*Barley.*	*Hay.*
Piedra Creek..........	30 bush.	50 bush.	20,000 lbs.	60 bush.	1 ton
Hall Creek............	37 "	68 "	50,000 "	60 "	3 "
Rio Grande............	40 "	63 "	31,000 "	55 "	1 "
Embargo Creek........	60 "	75 "	75,000 "	55 "	2 "
Near Del Norte........	25 "	40 "	15,000 "	30 "	2 "

Taking the five together, and getting the average, the yield per acre is as follows:

Wheat..	38 bushels
Oats	56 "
Potatoes.....................................	32,200 lbs.
Barley.......................................	48 bushels
Hay..	2 tons

To the general reader and intending settler, facts like the foregoing go further towards conviction than the finest spun theories that could be advanced by the most ready reasoner. What five farmers can do, five thousand can accomplish. Where five combine to construct a small canal, fifty, or one hundred, by like combination of money and labor, can build one correspondingly large, and by an equitable distribution of water, each secure enough to cultivate one hundred and sixty acres of land.

An intelligent journalist, Hon. J. S. Stanger, editor and publisher of the "Colorado Farmer," who attended a Farmer's Institute, held at Del Norte, under the auspices of the Agricultural College, during the winter of 1879-80, thus records his impressions of the Rio Grande Valley, from Alamosa to Del Norte: "In the great San Luis Valley lie over a million acres of as fine land as lies in this, or any other State. Flowing through it, about midway between two great ranges of mountains (the valley is surrounded by snow-clad spurs of the great Rocky Mountains), is the Rio Grande River—and well it deserves its name. Into the park also flow the Alamosa and Conejos, from the south; the Sagauche and other small streams, from the north. Not less than half a million acres can be irrigated by economy in the saving and distributing of these waters, and, as said before, no better land can be found anywhere. In fact, the soil appears to be better than the rich bottom lands on the Arkansas and South Platte rivers." And then he added: "the friends of the country are indeed surprised, to see farmer after farmer, who has plowed, sowed, and reaped, in the San Luis Valley, present for inspection by the convention the productions of farm, field, and garden; wheat as fine as any grown in the world; barley that can nowhere be excelled; oats weighing forty-five pounds to the bushel, and yielding enormously; timothy hay, growing as high as a man's head; evidence in plenty that all, save the tenderest vegetables, can be raised, while the small fruits succeed as well as in the vicinity of Denver."

Rio Grande County, lying on the western side of San Luis Park, is level on its eastern half, through which the Rio Grande courses its way, with an ample volume of water, capable of irrigating many thousands of acres of choice land on both sides of the stream. All the way up the valley, from Alamosa to Del Norte, the lands bordering on the river are fenced and cultivated, mainly for hay. These meadows have been carefully cared for, for years, until the most of them are in a high state of cultivation, yielding hay of good quality.

There are at present a variety of nationalities represented in the various colony settlements in the neighborhood of Del Norte. On the north side of the town is a German settlement of about two hundred people. These originally came out as a colony organization, but this distinctive feature of coöperation was soon lost. Most of its members, however, remained, and are occupying land in the immediate vicinity, under a canal four miles long.

In the patient, plodding way, for which this race is famous, they are gradually changing the face of the prairie, and now thriving farms meet the eyes of the traveller through their district.

A few miles below them, on the same side of the river, is a French settlement, consisting of a score or more families. They are late comers, just beginning to farm, and probably are the nucleus which will attract many more from the same nation, in the near future. They seem to have no desire to mingle with their neighbors, keeping strictly to themselves.

On the south side of the river, on a strip of country running from seven to fifteen miles below the town of Del Norte, about two dozen Swedish families occupy the bottom lands, raising grain, hay, and potatoes. These settled here in 1875, and have become a prosperous community. The canals watering the land are small in extent, each apparently having one for his individual use.

The Mexican element is considerable, being about one-fifth of the whole population of the county. These occupy the valley lying west of and above Del Norte. They farm in the style of their forefathers.

Of very large canals there are none, as yet. Two on the north side, as stated, cover an area not large in extent. One on the south side, eight miles below Del Norte, is twelve miles long, and reaches to Piedra Pintada (Rock Creek) watering the hay meadows on the north side of that picturesque valley. The wheat crop, therefore, is not large; thirty thousand bushels will cover the amount. Being raised mostly by Mexicans, it is not of the best quality, and as there is but one mill in the county, there is not much inducement to put in a large acreage. Oats yield abundantly, and most of the farmers pay more attention to this grain than to wheat, on account of a steady market in the mining camps near by. Potatoes are a staple crop, especially in the foot-hills beyond Del Norte, where the finest quality of tubers are annually grown. As high as nine hundred and thirty bushels have been obtained from one acre. The upper part of this valley, as in the Sagauche Valley lying to the north, seems to possess the soil peculiarly adapted to the growth of this tuber, and the two districts combined, could supply the entire State, if more attention was given to this crop. It is to be said to the shame of the farmers of Colorado, that California, Utah, and Iowa ship into the State two-thirds of the potatoes eaten there, when there is within its borders such soil as the two valleys above named, giving so abundant a yield.

Sagauche County has more acres in cultivation at present, than any of the other counties in South-western Colorado. In the early days of the San Juan excitement, when the mines of that wonderful silver-ribbed district were overflowing with hardy prospectors, the ring of whose picks could be heard in every gulch and on every mountain side, the product of her farms, gardens, and dairies, found a ready and a profitable market. For a period of time, the carbonate excitement at Leadville and kindred points, obscured San Juan; but the day has come again when the silence is broken, and the hum of mining development is once more heard. The demand for food for the multitude that is flocking thitherward, must be heeded, and Sagauche County, and more especially Sagauche Valley, is in a position to respond to the call. From her fertile soil, the tiller of the field will reap an abundant harvest and a gratifying financial return for his labors. The county has at least one hundred and fifty thousand acres of arable, pasture, and meadow lands, divided up into twenty-five hundred farms, of varying size.

The editor of the "Sagauche Chronicle," in enumerating the advantages possessed by his section of country, says of the agricultural resources: "as the streams, of which there are about twenty-five in the county, nearly all run in channels higher than the land on either side of them, and none of them having high banks, it is an easy matter to conduct the water in ditches wherever desired. When once a farm has been properly laid out for irrigation, and the main and lateral ditches completed, crops can be irrigated with but trifling expense per acre, without any fears of drouth. The ability that a farmer has of giving his crop water whenever it needs it, and the increased yield resulting therefrom, is considered by those accustomed to irrigating, as more than a compensation for the extra trouble and expense. The climate of this section is adapted to the raising of all kinds of vegetables and grains, except the later varieties of corn. Vegetables yield largely, grow to large size, and are of very fine quality. Wheat yields all the way from twenty-five to sixty bushels per acre, according to the quality of land and the attention it receives. The wheat raised here is pronounced by millers to be of better quality than any that is raised in the States, it often weighing sixty-four pounds to the bushel."

The rivers in this county have one peculiarity; they have no visible outlet, presenting thereby a counterpart of the district about Salt Lake, in Utah, only what is there a great sheet of water, is here but a vast stretch of swampy land. The Sagauche River irrigates over ten thousand acres of bottom land in a charming valley, forty miles in length, and yet the word valley hardly applies to these lands, for the stream is an immense canal of Nature's own construction, running on high ground with the lands sloping from it on either side its entire length until it reaches a basin, as it were, in San Luis Park, where its volume overflows, spreads out, sinks, evaporates, goes—who knows where? The mystery of its disappearance remains unsolved. What is true of the Sagauche River is also true of the San Luis, with its half dozen or more little tributaries. It flows along, a natural canal, about twenty miles in length, affording its nourishing fluid to numerous farms on either bank. In these valleys no expensive canal system is required, no following up the current for miles to get a head of water to distribute upon the adjoining territory; so that every farmer, almost, has his own canal, and the water division, to be adjudicated in this district, presents a phase thus far not witnessed elsewhere, in the number of claimants, the amount of inches claimed, and in the question of "overflow," something unknown in northern irrigating districts.

On the western side of the county, the Sagauche, La Garita, and Carnero, heading in the Sagauche range, flow into the park. On the east side, the San Luis, with its many tributaries, flows southward, meeting the waters of the other streams on the level of the San Luis lakes. About one-half of the area comprised in the county is agricultural and grazing land. The altitude is from six thousand seven hundred and fifty to seven thousand five hundred feet above the level of the sea. Mountains on the east, west, and north, give an indescribable grandeur to the scenery; and the valley, mortised as it were in the midst of the vast mountain bulk, presents an extraordinary symmetry of configuration.

On Sagauche Creek about seventy-five farms are located, ranging in area from forty to nine hundred and fifty acres. Two-thirds of the land is in hay, but cereals and potatoes are grown to some extent. Nearly ten thousand acres are irrigated each year, while it is claimed that twenty thousand inches of water flows in the stream.

On La Garita Creek, four thousand six hundred acres are owned by twenty-five farmers. The water in this is "appropriated" to the amount of six thousand inches, and there is probably no surplus. No new settlements are likely to be made on this creek, the land bordering on either side being entirely taken up. But farms here, as elsewhere, are always in the market for purchasers. On Carnero Creek, which is seventeen miles long, a number of Mexicans are farming. They own nearly two thousand five hundred acres, using seven hundred and fifty inches of water out of one thousand two hundred and seventy claimed. Here there is no surplus water inviting settlement. San Luis Creek, heading in the Sangre de Christo range of mountains, has a length of thirty miles. Into it a dozen or more tiny creeks empty. There is one canal of size taken out of this stream, being six feet wide and seven miles long. On this creek and its tributaries, fifty-five farmers own sixteen thousand eight hundred acres, their area in no single instance being smaller than a section of six hundred and forty acres, while three own over one thousand acres each, and one has three thousand seven hundred acres under fence as meadow and pasture land. About twelve thousand acres are irrigated, or receive the benefit of the "overflow." Aside from these settled farms, the "Gilpin Grant" lands are on the line of this stream and below it, in the south-eastern corner of the county, covering ninety-nine thousand two hundred and ninety acres. On these lands the owner claims an overflow of four thousand inches of water.

Of the products, hay takes the lead. From fifteen to twenty thousand tons are cut along the streams mentioned. Oats is the principal grain grown. A large yield can always be counted on. The story is told of one acre from which one hundred and twenty-two bushels were thrashed; this acre must have been of extra size. But little wheat, as yet, is grown. One mill grinds slowly, grinding all that comes in. Potatoes, as before mentioned, thrive wonderfully in this soil. The altitude may just suit this coy tuber, whose coquettish nature is so puzzling to the farmers in the valleys of Northern Colorado, and in all the valleys on the eastern slope of the mountains. But here the Early Rose, the Chili, and the hundred cousins, named and unnamed, grow and yield abundantly, having not the fear of the *Doryphora* before their eyes. Paris Green is an unknown element in the summer's calculation of the potato growers of Sagauche County. Not that the creature of stripes is not with them, but because it seems to prefer the juicy weeds of the field to the stalk of the potato, reveling upon them while they let the emerald gonfalons of the underground *pomme de terre* wave undisturbed in the balmy atmosphere. Using the language of Judge W. B. Felton, at that time editor of the "Sagauche Chronicle," it can be said "Standing, as it were, in the gateway to the immense bodies of mineral west of her, that promise so much for the future, it is not at all unreasonable to suppose that the agricultural prosperity of the past, will pale into insignificance in the era of grand prosperity that will dawn upon Sagauche County in the near future."

Costilla County, lying directly south of Sagauche, with the Rio Grande as its western boundary, is coursed by the Trinchara, Culebra, and Costilla rivers. There are a few Americans in this county, but the greater part of the farming is carried on by Mexicans, who follow the methods of their forefathers, as though they were like the laws of the Medes and Persians, and who stick to the primitive tools of ancient times with a tenacity worthy of a better cause. Wheat, oats, and corn are their main products, a careless cultivation giving only a moderate yield. But the needs of the Mexican are few in number and easily met. A few sheep are more to them than a field of grain. A goodly number of Americans, however, are on the Trinchera, where there are splendid hay ranches, and as seasons roll by, no doubt this entire section will be reclaimed from Mexican domination and make for itself a good record on the page of agricultural history.

Conejos County has in its eastern section the Rio

Grande, La Jara, Conejos and Alamosa Rivers. The amount of land suited to agriculture is large, but it is to be said that cultivation as yet, is mainly done in the three last-named valleys. Around Alamosa there are extensive hay farms; especially is this so in a strip of country known as the Sink of the Alamosa, where there are some valuable hay meadows, yielding thousands of tons, one man alone running eighteen mowers on his own land and on lands belonging to his immediate neighbors.

At Manassas, a few miles below Alamosa, on Conejos Creek, there is a large settlement of Mormons, and this county, in a very short time, is likely to be set apart to this sect. At present there are not more than six hundred people settled in Manassas and Ephraim, a town four miles distant from the first named. Since 1879 some farming has been done; small canals have been constructed, and evidence is ample that this peculiar sect have secured a permanent foothold in the State, and propose to effect a wonderful change in the agricultural status of the county. It is currently reported that the Scandinavian emigration is to be turned in this direction, and hundred of families settled upon the farming lands.

It is evident the Mormons are satisfied with the outlook, and they are not, as yet, looked upon with any disfavor by the Americans who are in the county. The State has sold them large areas of lands, without looking into the effect their social peculiarities may have upon the State at large. But as this aspect of the subject does not come within the province of this volume to discuss, I will not pursue it further. Looking at the possibilities of the future, as far as agriculture is concerned, it would seem as though Conejos County will swiftly rise into prominence as a wheat-growing section of the State. Those at present in possession do not appear to be a very thrifty set; but if a foreign element, as vigorous as the Scandinavians, should be settled in large numbers upon broad tracts of land, the result cannot be but favorable, as far as wheat culture is concerned.

From Manassas to the Mountains, the Valley of the Conejos is thirty miles long. The volume of water equals that of the Cache-la-Poudre, and as there is an abundant area of land on the north side of the stream, reaching to La Jara Creek, over which water could be carried at a reasonable cost for canal construction, there would seem to be an opportunity for settlement of a large and flourishing colony here, unless debarred by the Mormons. It is believed that seventy-five thousand acres can be cultivated. The soil is a sandy loam, deep and strong. The altitude is seven thousand feet, therefore only the hardy grains and vegetables can be raised to perfection; but wheat, oats, barley, and rye have an ample season in which to mature, and onions, potatoes, turnips, beets, and squash easily reach perfection. Wild clover grows in this valley and in those tributary to it.

Of Costilla and Conejos Counties, it may be said that the main settlement, thus far, is by Mexicans, whose careless system of culture has been before commented upon. They have raised, in years past, considerable grain, which found a ready market in the San Juan country. Since the Denver and Rio Grande Railway has traversed the region, there has been a considerable decrease in the volume of cereals. Joined to the natural indolence of this people, is an intense dislike to the rapid progress of civilization, and the approach of the railway—this symbol of the coming of a superior race—has led to the abandonment of hundreds of widely cultivated ranches. Freighting is now the main occupation of a majority of those who five years ago gave their entire attention to the cultivation of the soil.

The outlook for the future would seem to be encouraging. The flow of water, especially in the Rio Grande and the Conejos, is abundant, while the Culebra, La Jara, Trinchera, and a number of smaller streams, could readily be made available. The valleys are high and somewhat cool, more so than would be supposed from the line of latitude. If a colony like the one that settled Greeley could be organized and planted on the table land, between the Mormon settlement at Manassas, and the Toltec hills, its success, if rightly managed, would be marvellous. The advance of the railway to Durango and northward to Silverton, as well as southward across the border into New Mexico, and the certainty for a market for the cereals, hay, and vegetables, that could be raised, in the mining towns of the San Juan district, holds out a promise that was wanting when the Union Colony settled upon the banks of the Cache-la-Poudre. As regards the possibility of preëmpting or homesteading lands in these counties, the chances are not good. The great majority of acres of arable land is in the ownership of the State, under a Congressional Grant. But these can be leased or purchased upon easy terms.

A few words about the State lands of Colorado will not be amiss at this time and in this connection. Strangers to the State, who chance to look at the map, and see vast tracts of level, or undulating land, throughout the entire eastern portion, naturally conclude that there must be large quantities of available agricultural land open for preëmption and homesteads. But inquiry teaches them that these lands, although in composition they are very fertile, yet are almost barren on account of want of water, and occupation is precluded to the ordinary settler of western lands. These plains are only fit for the herds of cattle and sheep that feed upon the scant but rich herbage that grows upon them.

There were granted to the State of Colorado for various purposes, by the General Government, under Congressional enactment, at the time the State was admitted into the Union, lands to the amount of seven hundred and fifty thousand acres. The first State executive officers at once availed themselves of this opportunity to select for the State the choicest acres susceptible of irrigation to be found within the borders of the State. These lands were taken on the Platte River and its tributaries, in the South Park, and in the Arkansas Valley; but the largest, and probably the best body of State lands, was located in the Rio Grande Valley, in the great San Luis Park. Here the State selected some two hundred and odd thousand acres of land that is rich almost beyond comparison, and that will produce, in fabulous quantities, every cereāl and vegetable grown in the northern and central latitudes of the United States. These lands have not been occupied, because the State Board of Land Commissioners refused to sell, and adopted a policy of leasing; they could not be tilled on account of the want of irrigating facilities, and capitalists would not build canals for the uncertain tenure of leasing; so the choicest arable areas within the borders of the State lay idle for years. The General Assembly of 1881, however, enacted a law, authorizing the sale of one-half of entire tracts of these lands to persons or corporations who would build irrigating canals for the entire tract. Under this law the land has been eagerly sought for, and companies have been organized to buy areas and construct the required canals.

Unfortunately the waters of the Platte River have been, in a great measure, appropriated by prior companies, and the irrigation of the State lands lying in this pleasant, fertile valley is looked upon with some doubt by conservative and thoughtful men; yet large areas have been sold, and, as has been stated in the chapter devoted to the South Platte Valley, the construction of canals intended to irrigate them, has begun.

In the Rio Grande Valley there is opened a grand field for the development of the agricultural resources of the State. This river has but few canals throughout its entire length in the State, and there is in it sufficient water to irrigate many thousand acres, and the peculiar conformation of the ground is very favorable to the building of canals and for the distribution of the water. So very favorable is this latter condition, that the Hon. B. H. Eaton, the most extensive contractor and constructor of irrigation works in the State, in a report to the capitalists who compose the company known throughout Colorado and Great Britian as the "Northern Colorado Irrigation Company," said "the lands in this valley can be irrigated at one-fourth the cost that it requires in Northern Colorado."

To cover the State lands here, two great canals are projected, one to cover lands lying on the north side of the river, and the other on the south side. This last is incorporated under the name of the State Land Canal Company, and is being built as fast as possible, and the company expects to be prepared to furnish water and sell land, as early as the spring of 1883, though the entire line will not probably be completed before the spring of 1884. The altitude, ranging from six thousand to seven thousand feet, is rather high, still the season is long enough and the soil fertile enough to attract settlement where water is in ample supply.

The canal is located in the counties of Rio Grande and Conejos, though the greater length is in the latter county. It is to be thirty miles long, and it is probable that it covers more land for its length than any canal in the world, for the reason that its course is almost the chord of a semi-circle. There are to be three main laterals, and the total length of these are fully sixty miles. The main canal for the first section of five miles is seventy-five feet wide on the water surface, and is eight feet deep; water to flow on a grade of eighteen inches to the mile. As the canal progresses, the width is to be decreased so that the last section will probably be about twenty feet wide.

The writer, a few months since, made an extended tour through this promising region.

It was a bright, warm day in August as I journeyed over the plains that lie between Alamosa and Del Norte, on the south side of the Rio Grande River; around me stretched thousands of acres of land, the sod of which had never known a plow furrow; for countless centuries, summer and winter, with warmth and with cold, with sunshine and with storm, had come and gone, and still these plains lay green and thick with grease wood, sage-brush and gramma grass through the summer time, bare and brown through the winter months, and here they were still awaiting—what? Could anything be done to change their character?

I alighted from the wagon at various points on our journey, and with a spade dug down into the soil; here it was dark and full of fibrous roots; there it was soft, ashy in its nature; further on a sandy loam showed itself. Then, as I held these various specimens of soil in shapeless masses in my hand, there came to me the legend of Saint Raymond and his disciples, and these wide and apparently desolate plains assumed a new aspect in my mind.

Without water, a desert; with water, a Garden of Eden. And yonder, not seen with the eye from the point on which I stood, but signaling its presence by a fringe of green running for miles along the horizon, ran a river in whose bountiful bosom was stored the precious fluid whose touch upon these barren lands should be as vivifying as was the water to the Resurrection Flower in the ancient vase.

The possibilities of the future dawned upon me. Here was an empire unoccupied; here was room for a thousand homes; here were all things save men, capital, energy, faith. Why were they wanting in this fair San Luis Park, while in the far north no stream ran unfettered in its course, but from out each breast ran channels to irrigate the land and bring into blossom, bloom and fruitage, grains, vegetables, cereals, fruits? All around were the mighty mountains, looking down upon a magnificent plain, and through its course the Rio Grande del Norte, a stream greater than the Arkansas or the South Platte, but the mountains gave back no answer.

As in a dream I swept along until suddenly I was brought to a realization of the present. Here was a railroad track, and close beside it men and teams were busy with scrapers, throwing up the soil and making a canal wide enough and deep enough to float a schooner. The past with its eons of eternal silence vanished in an instant. The present, with all the actualities of the busy age, was before me. The crunch of the scraper in the sand was suggestive of a new era. The mule teams circling in gangs of five from canal-bed to berme-bank were types of labor, whose outcome should be for the rebuilding of the State and of the people. Here was a project in which man's skill was to direct a current of water from a channel in which it had ran for ages, and send it out over vast stretches of prairie lands to increase the industrial wealth of a commonwealth. Given water, the land is no longer barren; provided man, with hands hardened by toil, with brow browned by the summer sun, would do here as he had done elsewhere. Mother Nature, can she be less kind in the valley of the Rio Grande than she has been in the valleys of the Arkansas, the South Platte, the Boulder, the St. Vrain, the Cache-la-Poudre? No, let but the same conditions exist, and upon these plains there will rise as fair wheat fields, as prosperous homesteads, or intelligent communities as elsewhere, to make Colorado the pride of her citizens.

Think what will be the result of putting one hundred thousand acres of land where they can be utilized and made to serve the manifold interests of man? One thousand farms of one hundred acres each, all in cultivation, would make a wondrous change in the story now told concerning agriculture in Colorado. There can be as much wheat, oats, barley, potatoes, hay, and vegetables raised from the fertile lands under this company's canal, as is now produced in Boulder, Larimer, Weld, Jefferson, and Arapahoe, the five great agricultural counties of Northern Colorado.

Put these one hundred thousand acres into good cultivation and they would yield:

Wheat, 60,000 acres yield 1,200,000 bushels, valce,............	$1,800,000
Oats, 10,000 acres yield 350,000 bushels, value..................	245,000
Barley, 10,000 acres yield 400.000 bushels, value................	400,000
Potatoes, 5,000 acres yield 1,000,000 bushels....................	750,000
Hay, 10,000 acres yield 10,000 tons, value.......................	200,000
Vegetables, 10,000 acres yield..................................	300,000
Small Fruits (currants, gooseberries, raspberries, blackberries, strawberries)...	250,000
	$3,795,000

In the above estimate it will be seen that corn is left out. Still this is not because corn will not mature in the valley, for at Del Norte, fifteen miles west, and at an altitude fifteen hundred feet higher than the lands under these canals, the white Mexican corn thoroughly matures.

During the year 1881, produce was shipped into the State amounting to nearly twelve millions of dollars. Nearly all of this was for articles that can be raised here; that are raised here, in fact, only not in sufficient quantities to meet the demands of the people. This need not continue. It will not, when in this great San Luis Park, both south and north of the Rio Grande River, there shall be seen fenced farms, pasture and wheat lands, substantial farm houses and barns, and at various points central settlements, where churches, schools, reading-rooms, newspapers and stores are grouped together—tokens all of thrifty communities, civilized societies, and above all, an unerring index to comfortable and happy homes.

All this, in time. True, it takes time to accomplish this. But not so long, after all. What was there in the Cache-la-Poudre Valley in the year 1870? Only on the bottom lands were there hay farms, homes of old-time pioneers who looked upon the mesa lands or uplands that stretched above them as utterly worthless, save for grazing grounds for cattle, as homes for prairie dogs, and as ground fit only for cactus to grow upon. Now behold the change. By the entrance into that valley of energetic farmers, and their steady perseverance and tireless toil, they have added millions to the taxable value of the State, founded thriving towns, and dotted the uplands with a thousand farms, all under irrigation; canals whose life-giving waters have carried food and fortune to those who possess the land.

What has been done there can be done in the valley of the Rio Grande. Indeed, it was but by merest chance that the Union Colony of Greeley did not settle in San Luis Park. The Exploring Committee sent out in the winter of 1869—70 sought to pass over the Sangre de Christo range and into the valley lands lying under the shadow of Sierra Blanca. But then there was no railroad; busy hands had not graded Veta Pass for the iron link that was to bind Eastern and Western Colorado together. A heavy snowfall had rendered the pass impassable, and the committee failed to see a land of which they had heard much and favorably. So they turned their faces northward again and, sitting on the banks of the Cache-la-Poudre, saw in fancy the city of Greeley rise before them in a vision of the future.

Their dream was turned into a reality. Is there reason to believe that the experiment of twelve years ago cannot be repeated at this point in Southern Colorado? Here is the land; is it any different from that of Northern Colorado?

I believe it is better, having greater depth. Is there any less water? On the contrary there is far more than in the first-named valley, enough to water four times the amount of land. Is the growing season longer or shorter? Shorter, perhaps, but long enough for all kind of grain, hardy vegetables and small fruits, and there is no reason to doubt that apples and other standard fruits can be grown there, though this is not a fact absolutely established. Six months of growing weather, at least, can be safely calculated upon, and Canada and some of our extreme Northern and Eastern States cannot count upon so long a season, and yet apples are grown to perfection in these States. The land generally, it may be said, is a sandy loam, almost level, with fall enough to make irrigation easy and perfect, easily worked and irrigated, and the soil deep enough to last a generation for grain culture without requiring the application of manure. The water supply is ample, far more so in the San Luis Valley than elsewhere in Eastern Colorado, it having been estimated that the Rio Grande River will supply irrigation sufficient for three hundred thousand acres. All this land is virgin soil, waiting to welcome the farmer to possibilities unequalled anywhere in the States east of the Rocky Mountain Range.

And why "unequalled" you ask? I answer, because the expense of cultivation is less, the average yield more, the prices obtained better than elsewhere. These lands, when water is applied, will yield in value above all expense of cultivation, interest, taxes, etc., a net return per acre in crops as follows:

Wheat	$14.50	Potatoes	$ 60.00
Oats	17.00	Onions	250.00
Barley	16.00	Cabbage	350.00
Hay	15.00	Berries	400.00

The extensive system of the Denver and Rio Grande railway company, whose recent extensions have opened up the whole south-western portions of Colorado to settlement, courses through these lands, and gives an outlet to every point of the compass. The main line to far-off Durango runs via Alamosa. So does the line entering New Mexico. A branch—shortly to be built—will reach the mining sections of Chaffee and other counties by way of Saganche, while the eastern outlet is over La Veta Pass, whose beauty has been told by tourists, and whose Mule Shoe Bend is in the front rank of railroad engineering skill. Markets, near and afar, are thus within easy reach; for doubtless when settlements have been made along the line of this enterprising railway, there will be a station established upon some point on the lands under this canal that will be the depot for centering and moving the crops of the valley, at rates that will enable farmers to compete, at least, with Utah on the West, Kansas on the East, and Dakota on the North.

Prof. Hayden, in his report upon the cultivable areas of Colorado, 1876, declares that the agricultural capabilities of the San Luis Park, are measured only by the supply of water, and then adds: "Prof. Cyrus Thomas, in his annual report for 1870, page 198, estimates the land capable of irrigation at twenty-five per cent. without the use of reservoirs. In this estimate I agree with him. The amount of water which enters the valley north of the line of New Mexico, including the Rio Grande (which is by far the largest stream) will irrigate nearly thirteen hundred square miles. This is very nearly all the water which enters the valley. The area to be irrigated, then, is practically the entire area of the whole valley, and is about twenty-five per cent. of the whole area. I, however, suppose all this water is used in that part of the park which is in Colorado, and thus increase the irrigation to 32.5 per cent.

"This area is proportioned as follows, among the different streams which enter the valley. The Rio Grande carries, at the end of the irrigating season, not far from two thousand five hundred cubic feet of water per second. In that part of its course above the San Luis Valley, there is but little land that can be irrigated. The presumption that one cubic foot of water per second will suffice to irrigate two hundred and eighteen acres, will not hold good in the case of the Rio Grande drainage area here, for the soil is sandy, and involves a waste. Instead of three cubic feet per second to the square mile, five will be none too much. This, however, would give an area of five hundred square miles by the river and by its branches, as follows: Alamosa and the La Jara, one hundred miles; Conejos about the same; Trinchera seventy miles; Culebra fifty-eight miles; Costilla twenty-nine miles; Gata fifteen miles. It will be seen, that this gives, in round numbers, six hundred thousand acres of land within the borders of these four counties susceptible of cultivation.

It is not probable that there is at the present time over one hundred and seventy-five thousand acres of land in the entire State, yielding wheat, oats, corn, barley, rye, and potatoes, which crops are valued, in round numbers, at four millions of dollars. Computing from these figures as a basis, therefore, it would appear that the latent cereal wealth in the bosom of San Luis Park would, if developed, add nearly fifteen millions of dollars to the annual aggregate of Colorado's soil production. The Park may be said to be a Commonwealth in itself.

CHAPTER XIII.

SOUTH-WESTERN COLORADO.

In the south-western corner of Colorado there is considerable agricultural land, within the borders of La Plata County. The valleys of Los Pinos, Florida, Animas, La Plata, Mancos, Dolores, and San Juan, can each boast of a fertile soil of greater or less area. The trend of the surface being toward the south, there is thereby secured a genial climate peculiarly favorable to successful vegetation. The mean elevation is about six thousand feet. The mountains on the north, rising five thousand feet or more above the valleys, are like a mighty wall of protection against the northern blasts. These valleys are rapidly filling up with intelligent farmers, where the lands are not reserved for the use of the Indians. The entrance of the Denver and Rio Grande railway into the county has given a healthy impetus to the wave of immigration beating against this far-off corner of the State. At Durango, a prosperous city has been established, commanding the entire trade of the country. The mines in this vicinity are already producing great wealth, thus giving additional value to all the lands that can be cultivated in this section. There are, perhaps, twenty-five thousand acres of the best grade as to quality of soil, in this county, susceptible of the highest cultivation, and as productive as any in the State.

Los Pinos Valley, through the entire length of thirty miles, is admirably adapted to farming, the volume of water being abundant, and the soil very fertile. The valley of the Florida is small in extent, but exceedingly rich; the scenery is wondrously beautiful, and will, in time, make it an attractive point for tourists. Concerning the valley of the Animas, a writer in one of its local papers asserts that the name signifies the Spirit River, and is applied with entire propriety, as it flows along with a weird and murmuring sound, receiving the silvery water of rivulet and cascade, from glen and grotto, dashing anon through canon and gorge, until, reaching the vortex of a precipice, the seething waters of the cataract plunge into the lower channel, and leaving the Grand Canon, the majestic river sweeps around to its confluence. The upper part of this valley, only, is in Colorado, but it contains a magnificent stretch of farming land, beginning within three miles of Durango, ten miles wide, and twenty miles long. The altitude is six thousand five hundred feet; the summer and fall months are pleasant, the air being cool and bracing; while the winter climate is not more severe than other parts of Colorado. Timber and coal, gold and silver mines, abound in this vicinity. The timber is yellow and white pine, with some spruce and red cedar. The coal veins run from four to fifty feet, and are of the finest quality; equal to anthracite. The mining districts in the vicinity are La Plata, Rico, San Miguel, Silverton, and the Needle Mountains. The valley is distant four hundred and fifty miles from Denver, and but a day's journey by rail over the Denver and Rio Grande railway.

Rio Dolores Valley has but little land capable of cultivation. In what is known as the Big Bend, there is an area of two thousand acres, well farmed. There is said to be in Montezuma Park over five thousand acres of good land, to which it is proposed to lead the water of the Dolores, though the cost will be considerable; when it is done, this extreme outpost of the agricultural lands of Colorado will be made to bloom, beneath the magic influence of water, into beautiful gardens and fields. Even if the valley lands of La Plata County were all occupied and cropped to their utmost capacity, the supply would not equal the demand, in consequence of the rapidly increasing population of the mining districts in the immediate neighborhood of its principal town, Durango.

ON TO THE GUNNISON! was the battle-cry of the prospector, last year, and will be again. It has some importance, therefore, as a point toward which our agricultural products must flow. The mines create a market. The miners pay cash. The harvest gathered from the soil, under the genial influence of the sun and the water, is as golden as that taken from the hills, whose supposed wealth attracts so many prospectors.

In the Gunnison Valley, Prof. Wheeler, who has examined it thoroughly, claims that the agricultural lands are unsurpassed for their luxuriance of vegetation, and those who have long been residents are profuse in their praises of such sections of it as are now open to settlement. As yet no great amount of land has been put under plow. For the last two years the ranchmen have fallen victims to the mining fever, and the attractions of Ruby, Pitkin, Virginia City, and the Elk Mountains, have been too strong for the eager souls who want to get rich very fast. A writer in that country says that the excitement created by rich strikes in these new mining camps so demoralized the ranchmen in the Gunnison Valley, that the older the settlement grew, the more it became dependent upon the outside world, for produce its own neighborhood could produce with ease.

Farming has been followed, more or less, in the country below the town of Gunnison, since the spring of 1874, when a colony settlement was made there. From that time up to the present it has continued with variable success. Mr. S. Richardson, who has resided there since that year, says, "No better potato or root crops can be raised elsewhere than have been raised in the Gunnison Valley. Barley, oats, rye, and Mexican wheat do well when not over-irrigated. * * * * A few energetic farmers, like some I could name, who are already here, could revolutionize this whole country in regard to agriculture. Surrounded by the best mines in the world, with hard and soft coals in abundance, there will be, for many years to come, a market unsurpassed for magnificent prices for good articles. A place like this, accessible from all points, at all times, must, with its wonderful advantages, become the great metropolis of the Western slope of Colorado." Another writer has very truly written, referring to Grand Valley: "I believe I can truly say that there is no better land and no better climate on the face of the earth, with an altitude of from four thousand to five thousand feet, susceptible of producing everything by irrigation that would be desirable—fruit of nearly every description, and all the different varieties of grain and vegetables grown in the States of Missouri and Kansas. From an agricultural point of view, therefore, as well as from the miner's outlook, these hunting grounds of the savages will soon be changed into camp and farm. The finger of the coming civilization points to the Elk Mountains as steadily as the needle points to the pole."

The Uncompahgre has a valley from one to four miles wide, and thirty-five miles long. It is estimated that it contains about sixty-four thousand acres of land which can easily be irrigated, with perhaps a greater quantity on the adjacent mesas that could be watered, but would require the construction of expensive canals. The soil on the bottom lands is exceedingly fertile, and is capable of producing all kinds of crops that can be raised at altitudes between five thousand and six thousand feet. It is adobe, mixed with sand.

From just below the junction of the North fork and the Gunnison, there is a valley which is about ten miles long, ending at the mouth of the Uncompahgre. It is three miles wide, and easily watered. On the Gunnison, between the mouth of the Uncompahgre and the Grand, there are several valleys of from one hundred and sixty to one thousand acres, but the river generally runs through a canon. On the north of the river is a mesa (upland) where water would create good farms. Between the Gunnison and the Grand is some fine upland. It is a clay and sand soil, covered with wire and bunch grass. But it is too high to be irrigated save at considerable expense. If ever a canal is constructed, there are at least sixty thousand acres of land for farming. From the junction of the Grand and Gunnison, westward, for a distance of about thirty miles, on the north side of the river is a magnificent valley about four miles wide, most of which can be watered at no great cost. The soil here is the same as on the Uncompahgre, with perhaps less alkali and more sand. Patches of sage brush, grease-wood and squaw bushes, abound. These last mentioned are loaded down with a small red berry, resembling the currant, and is considered fully as good for cooking. On the borders of the streams there are groves of cottonwoods, and the foot-hills are covered with a splendid growth of cedar and piñon. Higher up the mountains pine and spruce abound.

Towns are springing up all through this, until now, inaccessible country. The Denver and Rio Grande railway runs through the entire region on its way to Salt Lake City. The South Park Branch of the Union Pacific railway is also in the same section. The two roads will meet at the junction of the Uncompahgre and Grand, and then run parallel with each other down the Gunnison and Grand. The land on the latter stream was surveyed not long since for an Indian reservation, but the Indians have been removed to Utah. Most of the land on the Uncompahgre and Gunnison has not yet been surveyed, but will be in the spring of 1883. These lands are open to settlement, pending survey.

On these streams there is room for thousands of farmers, and the mild climate will cause every available place to be taken. It is predicted that the lower Grand Valley will, in a few years, furnish fruit and vegetables equal to Utah, and also be a great resort for invalids. A recent visit to this valley tends to confirm this impression in my mind.

Park County, lying west of El Paso and Douglas counties, is watered by the South Platte and a number of small tributaries. It has little value as a grain region, or for the growth of general crops. The lands lie at a high altitude, and are surrounded on three sides by the main range and spurs of mountains. The cold winds from the snow-crowned hills sweep over them, and only at two or three favorable points near the eastern line of the county can any gardening or farming be done. But as a pastoral, a hay-producing county, it is excelled by none in the State. These industries constitute no mean item in the resources of the county. Perhaps fifty thousand tons of hay are annually cut, having a market value of nearly three-quarters of a million of dollars. The mining towns all around furnish a ready market. The soil is rich and deep, and the mountain slopes make magnificent grazing grounds, while the valleys of the streams are reserved for meadow lands. It is probable that seventy-five thousand acres of land are fenced for hay and pasture. In the main valley, especially, are hay farms, ranging in extent from four hundred to one thousand acres, all substantially enclosed and cared for. In the neighborhood of Hartsel, Garo, and Buffalo Springs, additions are constantly made to the hay lands. On Trout Creek there is one farm of four thousand acres enclosed in one fence. It is provided with an irrigating canal, seven miles long and ten feet wide, from which thirteen miles of laterals distribute water over the bottom lands. In a few years such a farm will annually produce three thousand tons of hay. At the junction of the two forks of the South Platte, thirty-three miles of fence enclose a pasture farm of three thousand nine hundred acres in extent, while two irrigating canals supply it with water. Near Buffalo Springs there is one farm of one thousand acres, where experiments in cultivating the native grasses have been successfully made, especially with red top and timothy. Specimens of timothy, four feet and four inches in length, with heads over eight inches long, have been taken from a timothy field of twenty acres in this county, grown at an altitude of seven thousand eight hundred feet. Seeded in the fall of 1879, used as pasture during 1880, last season three tons were cut to the acre. A late writer, referring to this county, says that, "when the land is enclosed and care taken in cleaning out the hummocks, the grasses root well in the uncovered soil, and some meadows return as high as three tons to the acre. The natural hay lands yield from one-half to one ton, and what may be termed foot-hills, from one-fourth to one-half a ton. Wherever irrigation is possible, excellent crops are raised that rate higher than any other hay in the market."

Cattle raising, as may be imagined, is a paying business in such a pastoral district. Some fine herds are kept. Some sheep are kept to good profit; they range on the side hills in summer, and are kept in well-protected enclosures during the winter.

Custer County has within its borders the Wet Mountain Valley. Grape Creek crosses through this, on its way to the Arkansas. The valley is ten miles wide and twenty-five miles long. It has an altitude of six thousand five hundred feet above the level of the sea. The first hay ranches taken up in this valley were in 1869. The next year a German colony of over one hundred families settled here, founding the town of Colfax. But the enterprise was badly managed. It failed as a coŏperative organization, and its members scattered. The soil of the valley is of a rich, black, humus nature. It will produce wheat, rye, barley, oats, potatoes, beans, and indeed all the hardy vegetables. In addition to these, a variety of corn, known as Mexican—a small, white, hard corn, can be raised, averaging thirty bushels to the acre. But the present (as well as the future) industry of this valley is hay, of which can be raised hundreds of thousands of tons of the finest and most nutritious quality. The grass in the valley proper, in the gulches, and along the mountain sides, is extremely rich, and has a spicy flavor, said to be equalled only by the grass grown on the mountains of Switzerland.

Though the German colony mentioned was a failure, still nearly one-third of its members remained, taking up land under Government regulations, and a fair measure of success has attended them. The valley itself is unequalled for beauty, lying as it does in an undulating basin, having Grape Creek for its drainage, with the snowy summits of the Sangre de Christo range and the Sierra Mojada on either hand. The width of the grass lands proper is three miles, while those that are bordered on both sides by table lands, vary from three to six miles. Ula, settled in 1871, is surrounded by a fine farming country, in which hay and cattle ranches abound. Numerous little creeks course through the valley, while the Ula Canal Company is a corporate institution, having an irrigating canal of considerable size, covering a wide area of land devoted to hay meadows.

CHAPTER XIV.

ARTESIAN WELLS—RESERVOIRS.

This subject is attracting some attention in the State. The General Government, owning so much vacant land within its borders, has twice appropriated several thousand dollars to be used in experimenting on the plains east of the Rocky Mountain Range. About two years ago, under the first Congressional appropriation, the Commissioner of Agriculture selected a point in the Arkansas Valley, just north of the town of West Las Animas, and within the military reservation of Fort Lyon, and from time to time work was continued on it, with but little success, until the appropriation was exhausted. There seems to be a belief that the site selected was unsuitable, and the money needlessly squandered. When the Commissioner was in Colorado, he hardly spent two weeks in examining the country, and it was scarcely known that he had come, before it was announced that he had made his location and had gone. Be this as it may, the results of the boring have been unsatisfactory.

Commissioner Loring, who has charge of the last appropriation, wisely sent out a commission composed of gentlemen eminently adapted for the position, to traverse the section of the country bordering upon the eastern range of mountains, and to report thereon before a new attempt was made at boring. They reported two locations in Eastern Colorado, at points called Akron and Cheyenne Wells, and this winter work will be commenced upon them.

The movement to sink artesian wells in Colorado is one of vast interest. If successful, hundreds of thousands of acres will be changed from merely wild pasture to arable land, capable of producing thirty bushels of wheat to the acre, and would thereby add millions to the producing industries of the State. A full development of its agricultural resources can hardly be had by irrigation, as practised from the natural surface flow of water. Large as it is at present, compared to what it was supposed to be ten years ago; and large as it will be when the water supply is systematized to the greatest good of the greatest number, even then but a few hundred thousand acres can be cultivated, while many millions will lie idle, affording scanty support to the cattle that roam over it. But the fact once established that artesian wells can be sunk upon the prairies, and a stride forward is made in the agriculture of Colorado which will put it in the front rank of grain-producing areas.

The Sahara of to day in Africa is a different desert from what it was half a century ago. Vegetation abounds, villages have sprung up, and the entire face of nature has been changed by the sinking of artesian wells. Nearly a hundred are in successful operation. Large areas of land have been placed under cultivation. The supply of water is abundant and of good quality, and the desert of ancient times is fast disappearing before the skill of modern science.

It is not certain that the vast waste of plain between the border line of rainfall in Kansas and the Indian Territory on the east, and the Foot-hills of the Rocky Mountains, can be reclaimed from their solitude and apparent desolation, and transferred into abodes fit for the habitation of man. Grass, sage-brush, and grease wood indicate fertility of soil. It is known that where sagebrush grows, the finest wheat producing lands have been found by our farmers in the valleys and uplands bordering our streams. It would seem as if all the elements of agricultural growth were lying *perdu* in the soil of the plains, lacking only one thing to bring them to fertile productiveness. That one thing is water. Does it sweep in subterranean streams beneath the soil? Is it flowing down the grade between the mountains and the plains? Where is the witch-hazel wand that can tap its hidden volume and bid it rise to the surface, meeting sunlight and starlight, and becoming submissive to the humor of mankind?

The first thing, then, is to know that it is there hidden beneath the sod. There are many who do not believe in the theory, who are students of science as well as practical observers. Prof. E. L. Berthoud might be mentioned as one of them, who believes that the chances of obtaining surperfluous supplies of water from artesian wells are inversely proportioned to their distance from the mountain range, and that "to attempt to bore for permanent supplies of water east of parallel one hundred and five, in Larimer, Boulder, Jefferson, Arapahoe, Douglas, and Bent Counties, will be infruitious and unsatisfactory, and cannot, we believe, lead to the discovery and delivery of large, permanent supplies of water."

An artesian well has been described as a small hole, sunk to a great depth in the earth, through which currents of water rise toward the surface and sometimes flow over. To secure this state of things, three conditions are necessary. First, a fountain head higher than the place where the well is to be bored. This is easy enough to secure in Colorado. Second, a moderate dip of the strata towards the site of the well. It is not so certain that this can be secured. Third, alternations of porous and impervious strata beneath the surface. This fact is yet to be ascertained.

The authority before referred to, Prof. Berthoud, in a paper on Artesian Supplies, declares that, though water may be found all along (but close to) the foot-hill range, from New Mexico to Wyoming, yet it fails to reach the surface; the water thus tapped is only the result of local drainage, or obtained from scattered crevices that exist everywhere in the porous sand-stone and slates, that underlie the whole region, and that this universal diffusion of underground veins, small in size, obtained by local drainage, is the reason of their failure to reach the surface or to flow above it.

Twenty years ago, near Fort Lyon, where the experimental work of boring for artesian supplies has been going on, an effort was made to obtain well water. At a depth of seventy feet, the same clay showed and not a drop of water was obtained. The experiment was abandoned, though the well was sunk in an affluent, then dry, of the Arkansas River.

The question, therefore, are there underground flowing currents of water coming from the vast mountain ranges in Western Colorado, remains unanswered. Until it is settled, it is useless to discuss what an amount of land can be watered from the flow thereof. The present outlook is against their success. For years to come, farmers are likely to find their supply for irrigation from surface-running streams, and from reservoirs, where vast supplies can be stored during periods when the volume of running water is greatest, and at times when but little is used for irrigating. At present one-half of what is used is wasted by careless usage, and two-thirds flow by unappropriated. There is water enough and to spare, for years to come, for irrigating purposes in Colorado.

It has been proposed, at various times, to increase the amount of water available for the purpose of irrigation, by the establishment of reservoirs at convenient points. There are times in the year when water flows in excess of the demand for its use, and when the regular season for irrigating is over, it runs away unchecked. This volume of precious moisture could be safely stored and drawn from when needed. A few lake reservoirs have already been tried, and in a limited way proven successful. In the neighborhoods of Greeley, Fort Collins, Longmont, and Berthoud, there are lakes used as reservoirs for farms lying below them. Still, there exists a feeling which, on the part of farmers in some districts, has grown into a conviction that, thus far, reservoirs have done more harm than good. One of the great drawbacks to this whole business of irrigation is the seepage. Spread out a large body of water in the form of a lake, and the waste on the lands below it will be much greater than that out of a canal. There is so much greater surface from which the water may leak. The water is standing at dead weight, on the lake, while it is running at a greater or less velocity through the artificial channel. Under some canals much land has been rendered untillable on this account, and farmers unhesitatingly affirm that they would suffer much less by this cause were it not for the seepage from reservoirs which have been made in some cases by the farmers themselves, in others by the water from canals gathering in natural basins, spreading out upon broad surfaces, from which the damage is redoubled upon the lands below. In the latter case, this waste from the ditch often forms a broad flag-covered marsh. In the winter this freezes over. The water and ice go on increasing until spring, when the thaw comes, and vast tracts of country are flooded. Invariably the canal is the cause of all, but the damage has been greatly increased by the use of reservoirs. A few have worked to a charm, but whenever the water that is wasted by thus sinking, passes through an alkali deposit, or through soil containing alkali in any considerable quantity, when it comes to the surface it will injure the soil, and often completely destroy its productiveness. In the Cache-la-Poudre Valley, hundreds of acres that were once very productive, have been abandoned on this account. There is little doubt, however, but that every acre of this class of land may be completely reclaimed and made most productive land. I have been told that such has been found to be the case in Italy, where people have been studying irrigation and its effects for centuries. The method to be pursued will involve drainage at some expense, which will pay, when lands become more valuable than they now are.

Ultimately, then, the fact of seepage as a cause of damage to land will not figure as a valid objection to the storage of water in reservoirs for future use in irrigating. Thus far these lake reservoirs have been constructed on the plains. No attempt has yet been made to store water in the mountains, but it seems as if the most practical locations would be found inside the foot-hills. There a great depth may be obtained in which a large volume of water can be stored, with but a small surface exposed to the action of evaporation.

Prof. Hayden, in his report of 1876, briefly adverted to reservoirs, but declared it to be unnecessary to dwell upon the subject, as the necessity for them was in the far future. Of this I am not so sure. We are beginning to realize that the storage of waste water is closely connected with our permanent prosperity, as far as agriculture is concerned, and it behooves us to consider carefully and well all plans that may be brought forward for this purpose. The Professor favored the plan, provided any movement was made in this direction, of constructing small reservoirs on the bottom lands. He says: "There are many points on the Arkansas and South Platte where, by the approach of the river bluffs to the stream on both sides, a dam could be built to connect them, at slight expense, and thus a considerable body of water imprisoned until needed. A succession of these, along the streams, placed where the local topography and the needs of the land require, would serve the purpose of utilizing all the water which is annually sent down from the mountains. As a favorable place to build a large reservoir, in which all the water of the Arkansas may be stored, I will mention a small valley in the midst of the canon of that river, called Pleasant Valley. It is about ten miles long by three in average width. At this point it could easily be dammed, and the water drawn off as needed by the channel of the river. A good point for forming a large reservoir on the Rio Grande is near the foot of San Luis Valley, where the river suddenly runs into a narrow passage between two perpendicular walls of basalt. A dam at this point would collect all the water which the stream would annually bring down."

In Southern Colorado, as yet, the need of the reservoir system is not apparent. But in the northern agricultural districts, where already a scarcity of water is experienced, in some years, the subject begins to assume immediate importance. It would have been far wiser to have spent the money appropriated for artesian well experiments, in the construction of one or more reservoirs to save the water running away on the surface, instead of wasting it to find whether water flows beneath the soil.

CHAPTER XV.

APICULTURE.

Ten years ago, if asked concerning bees in Colorado, but one answer could be given. The chapter devoted to them would be like that given to the subject of Snakes in Ireland: "There are no bees in Colorado." The one sentence would comprise all the facts.

To-day, a different answer can be given to such a question. Apiculture is an established industry in the State. A recent tour through all the valley lands, in search of agricultural statistics, gave the author full evidence that both in Northern and Southern Colorado more or less attention is being paid to this pleasant and profitable industry; and that, if it increased in the same ratio for the next ten years, at that time the market could be supplied with the home produce to the entire exclusion of that now brought from Kansas and California. I am inclined to believe that at least five thousand stands of bees, mainly Italian, are in the State; that Colorado is as well adapted to profitable bee-keeping as California; that the honey produced is fully as white, as pure and as sweet as any introduced into the market; that there is hardly a farm or a garden where bees will not thrive, and that the foot-hills are peculiarly adapted for extensive apiaries.

One who is now a firm believer in bee-culture in Colorado, once said, that the apparently desert plains and absence of honey producing plants made quite an unfavorable impression on his mind in the direction of apiarian science. Like the stockman on his first visit to the arid plains, who could not see grass enough to the acre to subsist a goose upon, he could only believe that a colony of bees here would soon starve to death. But his experience has made him change his views, and he is now the owner of one of the best apiaries in the State. He declares it to be true that millions of pounds of honey are left to waste their sweetness on the desert air, simply for want of bees to gather it.

In the East, warm weather with occasional storms, is necessary to a good honey season. A continual drouth is fatal to the bees' harvest. Looking at Colorado from this point of view, it would seem as if its arid climate would be unfavorable. But the belief now prevails, that the hot days, followed so invariably by cool nights, facilitate the secretion of honey in flowers and blossoms better than any other state of weather. In the East, days of drouth are usually followed by warm nights, which is fatal to honey prospects. Occasional showers cool the atmosphere, which is favorable; therefore the temperature is of more importance than dampness. Again, continual rains destroy the honey crop and deprive the bees of an opportunity to go upon the wing. Taking these things into consideration, we see why bees do so well in the dry climate of Colorado. Its hot days, followed by cool nights, give to Nature an abundance of sweets. With no prolonged rains, bees have an ample opportunity to improve the shining hour, which in Colorado means from sunrise to sunset, one day after another, week in and week out—as a rule. Thus it is to be seen that instead of being a poor bee country, Colorado is just the reverse. All that is needed to make honey an important item of wealth to be added to the prosperity of the State, is an awakened interest in the matter, and this it would seem is becoming more and more evident.

In considering the profit on a single colony of bees, the following data are from a record carefully kept by Rev. J. S. Flory, of Longmont. He says: "In 1878 I had a colony of bees sent me from Illinois. The cost, including a full-blooded Italian Queen, was fifteen dollars. This was in the fall of the year. More than enough honey was made to keep them over winter. During the season of 1879, the colony was divided once, and from the two, at the close of the season, a hundred pounds of nice honey were taken. Had an extractor been used, double the quantity would have been taken. In the two colonies about forty pounds of honey for each hive were left for them to winter on, so that the story of the first year is somewhat as follows:

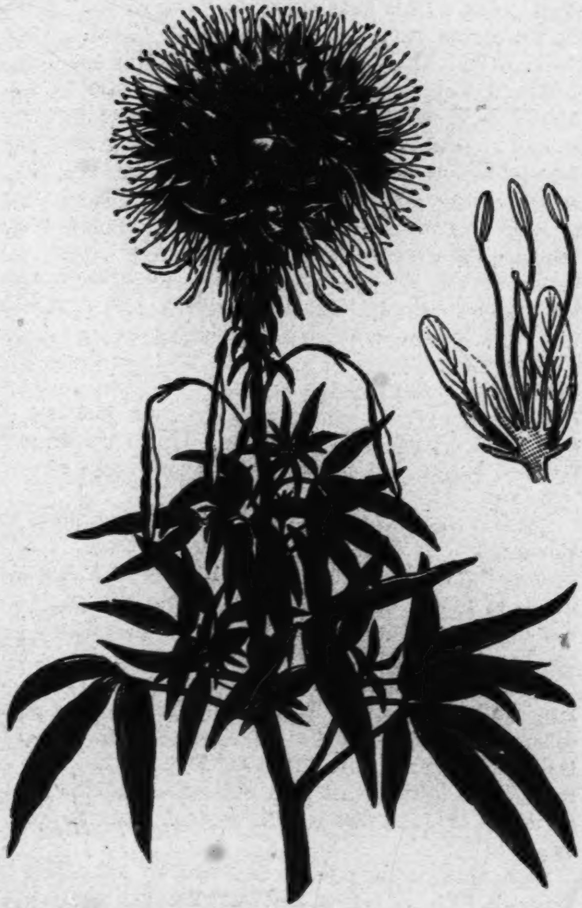
Cost of original colony		$15
Cost of one new hive		3
Total outlay		$18
100 pounds of honey @ 25 cents	$25	
Young Colony, worth	15	
	$40	
Profit on an investment of	$18 — $40	
or over two hundred per cent.		

Experience has shown that the Italian bee is the best, being more prolific and more hardy. It is from a climate somewhat similar to that of Colorado. Mr. Flory also gives the following directions to ensure success:

"A moveable comb hive. Colonies should be kept strong in numbers and rich in stores, in order to stimulate to early breeding. Enough common sense to know when and how to make artificial swarms, and when to let these alone. Too many colonies are killed by kindness—too much attention. The fatal mistake with too many is, wanting to get along too fast."

It is the experience of others, that Italian bees are able to obtain honey from flowers that the common bee cannot work on, because of the difference in the length of the tongue, the former having the longest, thus enabling them to work common red clover, which the blacks cannot reach.

Touching locations for large apiaries, Dr. King, of Boulder, considers that a short distance—say from two to six miles—inside the foot-hills, is the best; depending, however, upon the contour and height of the hills comprising the first uplifts. Where a canon or a gulch is open and wide, and the hills are low, a dry side gulch with a south-eastern exposure would be a good situation. In the early spring the bees go to the lowest foot-hills to get the earliest blooming flowers, and as the same varieties blossom at higher altitudes, they follow them up, and as the season advances, still keep following them up higher and higher. Then, as new varieties bloom below, they repeat the process during the entire season of bloom. But it is also to be said that bees do well upon the plains, in the valleys, and wherever land is under cultivation; for the face of nature here is covered from early spring time to late fall with flowers that afford honey in great abundance. Trees, wild blooms, vegetable blossoms, wild grasses, cleome, alfalfa, corn blossoms, all offer their store of sweet treasure to the ever busy bees. In considering this source of constant supply, it is a fact of great importance to know, that from the early part of March, generally, bees begin to gather pollen and honey from willows on southern hill sides and sunny slopes, and from this time to October, there are very few days that honey is not gathered from some source. Now contrast this with the season in the Eastern, Middle, or even Western States, where the honey season seldom lasts three months, and it will be seen that Colorado is one of the best States in the Union for bee culture. Pasturage is profuse in its abundance. With the willow blossoms comes a species of *Delphinium*, pushing its head up even through the snow, and covering foot-hills and plain with its bloom. Wild roses and red raspberries abound in the



CLEOME, OR ROCKY MOUNTAIN BEE-PLANT.

foot-hills. On the plains, with the willow and cottonwood, comes a little weed called the "hog potato," growing flat on the ground. It has a purple bloom. Then there are fruit blossoms and wild roses in May and June; milkweed and immeasurable wild flowers also appear. Alfalfa is in its first bloom and is favorite foraging ground for the busy bees. In July the wild grasses and the wild flowers tempt the roving fancy of the bees, while melon, squash, and other vines invite the winged seekers after sweets. During August and September, corn-tassels, alfalfa, amber cane, furnish abundant food. At this time, too, the prairies, in spots, are covered with cleome, or the Rocky Mountain bee-plant, with its wealth of purple flowers, in which lies hidden an amount of bee food one little dreams of, which the bees transform into the choicest honey that can be found. In October, there grows on dry prairie land, a weed the shape and size of sage brush, having a yellow bloom. This is not the best bee food known, but is used when other things are not to be had.

There is one drawback to bee culture which must be mentioned. It comes from too much warm, sunny weather in winter. This causes bees left on summer stands to fly out, and doing this day after day, many are lost and never return to the hive, and as they do not begin breeding until February, and then very slowly, the numbers rapidly decrease, and often the entire swarm is lost, from this cause. The remedy for this is a good cellar, well ventilated and so arranged that the temperature can be kept at from 40° to 45° Fahrenheit. It is to be said, in addition, that perfect darkness and the greatest degree of quiet that can be secured must be maintained.

Such, then, is the present condition of Apiculture in Colorado. Plains, valleys, and foot-hills alike seem adapted to success.

If there are five thousand hives in the State at the present time, taking the increase from these alone, without any fresh additions from the East, as doubling each year, what is the outlook for the future? A little figuring will show that in a few years five million hives will be in Colorado. The honey problem, therefore, is as suggestive of profit as the product is of sweetness. Few so poor that they cannot afford one hive. Few hives but double each year, and also yield at least fifty pounds of choice honey. John Allen, in his book on the Blessed Bees, shows that under the most favorable conditions, bees increase in number very rapidly, and he cites an instance under his own observation, where three hives increased to nineteen in one season.

CHAPTER XVI.

FRUIT GROWING.

Fruit growing is in its infancy in Colorado, but it promises to be an industry of some prominence. When it is known how they can be grown there will be no trouble to raise fruits of all kinds. It is with the horticulturists of the State as it is with the child learning to walk. Steps are feeble and uncertain at first. There is an unknown quantity to master. There is doubtful ground to tread. The time comes when the child knows its own powers, and thereafter walking is no problem. The main difficulty in fruit growing lies in the difference of climate between this State and those at a lower altitude, and the application of known theories and facts that govern these two different conditions existing here. There is so much to unlearn, in horticulture as well as agriculture, before it can be made successful. As the President of the State Board of Agriculture once remarked: "The soil contains nearly all the ingredients necessary to produce all kinds of fruits that can be grown in the Northern States, and with a right knowledge of the way to manage fruit trees, we shall succeed in making this a fruit-growing State, but this knowledge can only be obtained by experience."

Ten years ago, a fruit grower in Boulder County, in the month of April, looked over what was then an extensive orchard for Colorado, and saw over three hundred peach trees, besides apple, pear, plum, and cherry trees, destroyed, so far as that year was concerned, by the cold, severe winds that swept down the valley as late as the

22d of the month. He saw, in addition, the canes of his raspberries, and blackberries, and the vines of his grapes killed to the ground. Surely such a sight would be enough to discourage the most ardent fruit grower. *Mene, mene, tekel, upharsin* seemed written of the country, as far as fruit was concerned. But this courageous man did not say so. Perhaps he recalled the fact that, in the early settlement of States like those of Iowa, Illinois, Wisconsin, Minnesota, Nebraska, and Kansas, many difficulties were encountered by those who firmly believed that, the proper conditions secured, success would wait upon fruit culture, and to-day these States stand in the front rank of fruit producers.

Returning to his sitting-room, Joseph Wolff, of Boulder, wrote as follows: "Notwithstanding the disastrous results of last winter and this spring on the various kinds of trees and vines, there is no need for any one to be discouraged. * * * * Fruit culture in Colorado is a system of experimenting, and must for many years be largely in that condition, until experience shall determine what varieties to plant, the soil required, the proper tillage, the effect of irrigation, mulching, fertilizers, and other equally as important matters. Croakers should bear in mind that of all the trees planted, but few are old enough to bear fruit, and in nine cases out of ten, they have been planted, cared for, and tilled, in a most unthrifty manner. My own opinion is that Colorado will yet rival any of the Middle States in the production of fruit, and for one I propose to keep on trying until I succeed; not in getting a few bushels of little, knotty, sickly trash, but an abundance of large and luscious fruits of all the hardier varieties. Of the peach I have but little hope, but even that may be successfully produced, when we know how."

The same year, at a Farmer's Club, held in Denver, one of the speakers said: "I have twenty-five varieties of apples, ten of pears, five of cherries, and ten of plums. There were a few killed last winter, the season being the hardest on trees I have ever known in this country. But I think that apples will yet be as sure a crop with us as wheat. Cherries will do as well, provided the right variety is chosen, which should be none of the kind called sweet."

What was then a prophecy is fast becoming a realization. Yet not without many failures and discouragements and loss of time, money, and temper. At first, all trees were planted on the bottom lands, where heavy, clay soil predominates, and where it was supposed they would only grow. All along in the valley of Clear Creek and of the South Platte, in the vicinity of Denver, hundreds of trees were planted and flourished, for a time. As the period of fruiting grew near, it was observed that the tops of the trees began to die, and soon the whole tree showed that something was sapping its vitality. For awhile the cause of this was not discovered, and when it was found out, it was something that could not be prevented. The roots of the trees had penetrated through the soil, and in the sand and boulders below found no nourishment.

So the work of a dozen years was brought to nought. A new departure was to be taken, or the attempt abandoned. This, fortunately, was considered out of the question, and to day, on the uplands of Clear Creek stands an orchard of trees removed years ago from the bottom lands, apples from which in the fall of 1879 took the special premium given by the Governor of the State for the best collection of apples.

The President of the Colorado State Horticultural Society, Mr. D. S. Grimes, may be accepted as good authority. In response to inquiries, he says that enough has been grown to demonstrate the fact beyond a doubt that this industry can be as successfully carried on in

Colorado as in other States. From personal observation I am convinced that the greatest enemy to successful fruit growing is the grower himself. If the people treated their garden and field crops as some of them do their trees, failure would undoubtedly follow. Wherever an honest, intelligent effort has been made, trees are growing, and doing well. Indeed, under fair treatment, it is hard to tell what varieties will not succeed. Fruit is a natural production of the country. In the mountains and along the rivers and creeks are found currants—red, black, and yellow, the last named especially large and excellent. Raspberries, strawberries, whortleberries, June berries, are gathered from the foot of the mountains up to snow line. In some localities, especially in Fremont County, there are wild plums of larger size and as delicious flavor as one-half of our cultivated varieties. There are wild fruits growing in the canons of Colorado which, when brought to the light of cultivation, will be jewels in the horticulture of the country. The soil along the mountain streams, and for miles out on the plains, is a rich alluvial of decomposed matter, brought down from the mountains, containing all the elements essential to tree and vegetable life. All varieties of fruits grown here are smooth, free from worm or insect, heavy, juicy, and of a fine flavor, a characteristic so marked as to enable our people to readily distinguish the fruit grown here from that brought from other States. Trees come into bearing earlier here than in the East. In growing, the tops incline low, producing a heavy foliage, while the bark is of much lighter color than that of the same variety brought from the States. Our soil and climate exhibit many peculiarities, but I fail to see anyanything to hinder Colorado from becoming a great fruit-producing State, except failure in planting and improper cultivation.

There is hardly a valley in the State where fruit is not grown in greater or less quantity. In the Poudre Valley one of the most successful growers is Mr. J. W. Parker, of Greeley, who has an orchard of over two thousand apple trees. The Ben Davis, Fameuse, Winesap, Astrachan, and Duchess of Oldenburgh, all do well with him. He pays especial attention to crabs, finding in Denver a ready market for all he can ship. His principal varieties are the Transcendent, Hyssop, Tetofsky, and Briar Sweet. He also has Flemish Beauty and Duchess de Angouleme pears in bearing, the Early Richmond cherry, and the Lombardy plum. Mr. Parker, after an experience of five years, believes that not only apples, but pears, plums, and cherries will be staple crops in years to come. He advises all to plant orchards, and if the grasshoppers come, to smoke them out; if the Blister-beetle troubles them, administer Paris Green; destroy the ants, kill the gophers. In a word, take care of the orchard, and some day not very far distant, cider will be sold at ten cents a gallon in Colorado.

The entire valley of the Cache-la-Poudre, from the canon where it empties into the Platte, is becoming dotted with small orchards. Hardly a farmer but what is setting out trees. Some will succeed. Some will fail. The one, because he gives good care and careful culture, the other because he gives indifferent care and careless culture. One will say that fruit will grow, and show with pride his apple-bearing trees and his loaded grape vines; the other will say that fruit will not grow, and point to worm-eaten trees and blasted vine as proof of his assertion.

As in this valley, so in the St. Vrain, the Boulder, Big Thompson, Ralston, and the other valleys in Northern Colorado. Mr. J. S. Flory, of Longmont, wrote as follows, in the fall of 1879, regarding his orchard in the valley of the St. Vrain: "If the most skeptical could see my orchard, they would conclude that apples, pears, and peaches can be successfully raised in Northern Colorado. The spring was very unfavorable for fruit, all the early bloom being killed, yet some of my apple trees are so loaded with fruit, that I am under the necessity of tying and propping up some of the limbs. The Duchess of Oldenburg and Fall Stripe are as nice apples as one wishes to see. They seem to come to perfection in every respect. The Early Richmond cherry bears abundantly. As to grapes, every vine is loaded, and it is true, as has been said, 'it is as easy to raise grapes as squashes, when you know how.' What kills three-fourths of the trees is the warm winters, in which the hot rays of the sun beat upon the south-west side of the trunk of the tree, heating it and starting the sap; then, at night a severe frost coming, the tree is ruined."

While it is shown that fruit can be grown very successfully in Northern Colorado, I am inclined to believe that the best region lies south of the Divide, and on the western slope, in the valleys of Gunnison County, where a warmer climate, a sandier soil, and a longer season prevails. In the Arkansas Valley, on this side of the main range, and the Grand Valley with its numerous tributaries in Western Colorado, lies the Eden of the horticulturist of the next and succeeding generations.

The varieties positively adapted to the climate of Northern Colorado, cannot be definitely given. Those that have been tested and found to thrive, can be named. The Farmer's Institute, held at Fort Collins, in the winter of 1880–81, named the following as best adapted to that region:—

Summer varieties: Red Astrachan, and Duchess of Oldenburg. *Winter varieties:* Ben Davis, White Water, Pearmain, Genitan, Wagner, and Jonathan. Others might be named, that have succeeded with some. Such as the Early Red, Sweet Bough, and Golden Sweeting, for summer; the Maiden's Blush, and the Limber Twig, for autumn; the Roxbury Russett, for winter. In cherries, the English Morellos. In pears, the Bartlett for summer, Flemish Beauty for autumn, Vicar of Wakefield for winter. In plums, Colorado ought to take front rank as a producer. Here they are entirely free from the Curculio, and are only injured by hail storms. They grow wild in the canons and among the foot-hills; they flourish to perfection when transplanted to the plains. To give a list of varieties would be to name, almost, all those contained in the catalogues. In peaches, the Amsden, Crawford's Early and Late, and Hale's Early, have been grown, but not to any encouraging extent. The Peach of Colorado has not yet been born, or, if born, is yet in swaddling clothes, and has not been brought to the baptismal font for naming.

In Southern Colorado, more especially in the Arkansas Valley, apple and grape culture are receiving the exclusive attention of many persons. In the neighborhood of Canon City there are orchards that have produced heavily for years. At Florence, is a twenty-acre apple orchard, ten of them in bearing, probably the largest in the State. The soil of the valley is of an adobe character, full of limestone, and seems peculiarly adapted to apple culture. Anson Rudd, and W. A. Helm, of Canon City, have fruit gardens that would delight the eye of the horticulturist. Mr. Rudd commenced planting as early as 1864, meeting with but little success, but now an orchard of two hundred trees rewards his patience, perseverance, and faith. His trees grow low, many of the branches, when the fruit is on them, bending to the very ground. He applies salt in abundance, believing that too much cannot be scattered on the soil about the trunks of the trees. Besides apples, he has been successful in raising pears, peaches, quinces, and grapes. Concerning the future of fruit he is very sanguine, believing that the entire Arkansas Valley will be filled with orchards within the next ten years.

W. A. Helm, of the same place, began planting in 1867; he has not so large a number of trees, but in variety they are unequalled in the State. His favorites are the Red Astrachan, Winesap, and Genitan. Of pears he grows the Duchess, Bartlett, and Quince Pear, and has no question but that this delicious fruit is admirably adapted to the Arkansas Valley. He has two apricot trees in bearing, as well as black walnuts, mulberries, and persimmons, while hazel bushes profitably occupy a corner of his garden. Of grapes, he has the Concord and other Eastern varieties, but is giving special attention to three or four California varieties, which he thinks will do well in Colorado. The Rose of Peru, a black, and the Muscatel, Sweet Water, and White Chasselas, all white, are kinds he has had in bearing for the last five years, and thinks they will do well, at least in Southern Colorado. The Salem is his favorite of the Eastern varieties.

Mr. Jesse Frazier's twenty acre Apple orchard is at Florence, ten miles east of Canon City, on the Leadville branch of the Denver and Rio Grande railway, and is visible to travellers on the trains that daily pass up and down the valley. He has fully one hundred varieties, among which may be mentioned the Ben Davis, Winesap, Genitan, Jonathan, Golden Russett, Red Astrachan, Duchess of Oldenburg, and Bailey's Sweet. He gives preference to the following:

SUMMER APPLES,

Jeffries, Duchess of Oldenburg, Early Harvest, Red Astrachan.

FALL APPLES,

Cole's Quince, Sweet Pear, Jonathan, Fameuse or Snow Apple.

WINTER APPLES,

Ben Davis, Winesap, Willow Twig, Rawle's Genitan.

It will be noticed that everywhere the Ben Davis is set in the front rank as a safe apple to grow in Colorado. Thus, in both Northern and Southern Colorado, proofs are accumulating that the State has within it the germs of success in fruit growing, and within a few years will begin to supply the demand from home orchards. The green fruit trade of Denver is enormous. The sales amount to nearly a million dollars yearly. Five hundred car-loads is a low estimate of the amount of California and Eastern fruit brought into the markets of the State.

Concerning the Small Fruits, as they are termed, they are becoming quite abundant. Hundreds of acres in the immediate vicinity of Denver are in grapes, currants, gooseberries, raspberries, blackberries, and strawberries. The profits are enormous, especially from strawberries. The wholesale price of small fruits in Denver during the last season, was as follows:

	Per Quart.
Strawberries	25 cents.
Blackberries	35 cents.
Red raspberries	50 cents.
Black cap	35 cents.
Currants	25 cents.
Gooseberries	20 cents.

The cost of cultivating one acre of strawberries is about fifty dollars. Water costs two dollars per cubic inch, and two inches is sufficient to water an acre of berries. It costs three cents per quart for picking, and about two cents for boxing and preparing for market. A yield of eighteen hundred quarts can be taken from one acre. The entire cost of cultivation and placing upon the market is not over one hundred and fifty dollars, leaving a net profit of three hundred dollars per acre. All kinds do well, but need high and close cultivation, bearing for five years before they require to be renewed.

CHAPTER XVII.

QUESTIONS AND ANSWERS.

During a residence of more than twelve years in Colorado, mainly in the agricultural sections, and having had much to do with the founding and establishment of farming towns, it has been my fortune to answer many questions concerning the State. By grouping a few of these together, there can be given, in brief space, much information that will prove extremely useful to those who have it on their minds to make Colorado their home, but who have not, as yet, broken loose from their old associations:

Are there any Government lands to be had?

Yes, but very little, if any, under canals that are built, or close to any settled communities.

Where can these lands be found?

Mainly in Southern Colorado, in the valleys of the Arkansas and Rio Grande del Norte, in the valleys of the Uncompahgre, the Gunnison, and the Grand, in Western Colorado, and along streams tributary to these rivers.

Can a man without means enter upon Government lands with a hope of making a home easily and early?

No. And yet this can be qualified by the statement that men have done so; but they were single men, and could submit to the worst kind of roughing. It would be criminal for a man, with a wife and children dependent upon his labor for their daily bread, to attempt what an unencumbered man might reasonably do "in chancing success."

How much money ought a young man to have?

A young man with three hundred dollars in his possession, when he reaches Colorado, can easily secure a foothold, and eventually become a land owner.

How much ought a married man to have?

If with a small family, he should have at least five hundred dollars. With an economic management, in-doors and out, this will secure land, a cabin, and subsistence for the first six months.

What is the best time to come?

In the fall, for the preparatory work of moving, getting settled, and preparing for spring work should not be put off until the sowing season comes.

How early does the season open?

Some years as early as February plowing can be done.

What kind of land should one get?

This is a question not easily answered. If a homestead can be secured in the immediate vicinity of a growing town, or with railroad facilities for shipping produce to distant points, within reach of schools, churches, and social privileges, the question answers itself. But there are few such homesteads to be had, except by purchase from some one already occupying the land.

How about railroad lands?

There are but little, if any, now to be had from the railroad companies. Most of the available arable land unsold has, within the last two years, been contracted to companies formed for the purpose of constructing and operating irrigation canals. These hold the land, of course, at a higher rate of valuation than did the railroad companies. Still, present prices are not exorbitant, and intending farmers can easily do worse than purchase such lands.

Is water absolutely essential?

Yes. Without it, Colorado is a desert. With it, an Eden exists again, on the slopes of the Rocky Mountains.

How are the winter months?

Usually, mild, compared with the same latitude on the Atlantic Coast. We get the benefit of the ocean currents of the Pacific, and the influence of the soft, mild westerly winds which prevail in the winter, coming from that warm ocean. Sometimes the mercury, in February, runs as high as seventy degrees in the shade. The snows in winter are generally light.

Are there ever any severe snow storms?

Yes. And they come when they are least expected.

When is that?

In the months of March, April, and May.

Are the summers extremely warm?

In the middle of the day, in the months of June, July, and August, it is very warm. But in the shade there is always a refreshing coolness, while the nights invite to sleep as deep as it is invigorating.

What is the amount of rain fall per annum?

It may be set down at about twelve inches, or one-third of the mean precipitation on the surface of the globe. Three-fourths of this falls in the early spring months, securing the germination of grain without irrigation, and the annual growth of grasses upon the prairies, on which such vast herds of cattle grow fat.

Do you have high winds?

Yes. What would you think of an ocean, whose waters were never in motion? What kind of a country would it be where the air never circulated, but remained motionless? But there are no tornadoes, like those in the tropics, and while the whirlwinds which devastate Iowa, Illinois, and Missouri, may have their birth in the hills of Colorado, they go out while they are young and innocent of harm. In the heavier atmosphere, miles below the altitude of the foot-hills, they may get obstreperous and behave badly. In the spring months, especially when the winter has been open and mild, winds prevail, and are, to say the least, annoying—"only this and nothing more."

What is the general nature of the soil?

A sandy loam predominates, though a stiff clay is occasionally met with. It is very easy to work, and only requires common attention to return a thousand fold.

What can be raised in Colorado?

Almost everything. Wheat, corn, oats, barley, rye, amber cane, vegetables of all sorts, fruits of nearly every kind common to our latitude. In fact, whatever is raised in Illinois, New York, Pennsylvania, Michigan, or Nebraska, can be raised in Colorado.

What is the average yield of the principal products?

Wheat, twenty-two bushels; Oats, forty; Rye, twenty; Barley, thirty; Potatoes, one hundred and twenty. These are low figures, and are likely to rate one-third higher. It is no uncommon thing to find an eighty-acre field of wheat running forty bushels to the acre.

Do you get good prices for your products?

Yes. There have been years when low rates prevailed, as they have done elsewhere. But Colorado is so rapidly filling up with settlers, the majority of whom are nonproducers, that everything the farmer can produce will bring him a good price. At the time this chapter is prepared, wheat rates at one dollar and fifty cents per hundred pounds; corn, one dollar and seventy-five cents; oats, two dollars and ten cents; potatoes, two dollars and twenty-five cents; onions, two dollars and fifty cents; cabbages, one dollar and fifty cents.

What about Dairying?

Parts of Colorado are eminently adapted for dairying, of which there is little, as yet. Inside the "foot-hills," as the most easterly tier of low hills is called, are small parks that are sheltered and extremely favorable. The

"Divide" is a stretch of country with an altitude of from six thousand to seven thousand feet above the level of the sea, running for thirty miles in an easterly direction from the mountains, lying between the South Platte and Arkansas Rivers. This region is to be the great dairy region of Colorado. Its resources are abundant and extremely nutritious grasses; a plentiful supply of water in the shape of springs and brooks; a cool summer climate, rendering it possible to make as good butter and cheese in summer as in fall.

Are there any cheese factories?

Two or three; there should be two or three dozen.

What do butter and cheese bring?

From twenty to thirty cents in summer, from thirty to forty cents in winter. Cheese retails at twenty-five cents per pound.

Are the markets certain?

Yes. The mines furnish a very profitable market, and towns are springing up in every direction. These people must be fed. Not one-third of the supply is raised in the State. California and Utah send potatoes, honey, and fruits. Kansas and Nebraska send wheat, hay, oats, and corn. Millions of dollars go out of the State each year, for grain, and produce, and feed, that ought to be raised at home.

How do prices compare with those in the East?

Not unfavorably. Clothing, building material, dry goods, are a little higher, perhaps, than in the far Eastern States. In the mining camps prices rule above those that prevail in the country towns on the line of the great thoroughfares.

Do you burn wood or coal?

Coal, mainly, in all the farming towns. In the foothills and mining camps, wood. Coal of excellent quality ranges from four dollars to six dollars per ton.

The preceding questions will cover a multitude of points about which great ignorance prevails. They are the *minutiæ* of practical interest to the new settler who wisely "counts the cost" before he ventures into unknown lands. A chapter devoted to these details has some value, if the facts as stated can be relied upon. For this, the reader has the author's pledge that, intentionally, no false statement is made. Colorado is settling up fast enough without having to miscolor or misrepresent. Its advantages are so numerous that there is no need to go beyond the boundary of actual fact.

CHAPTER XVIII

COLORADO AGRICULTURAL COLLEGE.

It may not be out of place to present a brief account of an institution in which the farmers of Colorado have a special interest, and one in whose success all the citizens of the State will share. The State Agricultural College, located at Fort Collins, Larimer County, was opened in 1879, its doors swinging wide to all who desire admittance, offering opportunities for education in the industrial branches of learning which cannot fail to prove beneficial. Gov. F. W. Pitkin, in his last message to the Legislature, recommending an appropriation in addition to the regular State tax, used the following language: "The farmers of the State have not, as a general thing, the time or the means to carry on experiments on a large scale. They are compelled to produce a crop annually for the support of their families, and cannot make tests of many varieties of seeds and different methods of cultivation, when they know that a majority of these experiments must be conducted at a loss. The object of the College is to have these experiments carried on under the supervision of a person specially educated for the purpose, that the test may be conducted intelligently and under the most favorable conditions, and that the results obtained may be accurate and entitled to the confidence of the farming community. These results are not only given to the public through printed reports and newspapers, but they are witnessed by the pupils of the College who assist in the labor, and through them the different portions of the State from which they come are directly benefited. The College affords opportunities for its students to obtain a thorough education in the sciences and mathematics, and also in scientific farming, and at the same time brings to the knowledge of agricultural communities many new facts, by which their business may be more profitably conducted."

The College was organized in accordance with the provisions of the act of Congress of 1862, by which lands were granted to the amount of thirty thousand acres for each Senator and Representative in Congress for the endowment, support and maintenance of at least one college, where the leading object shall be to teach such branches of learning as are related to agriculture and the mechanic arts, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life.

The leading object of the Institution—to use the official language of the Faculty—is to impart a thorough and practical knowledge of all the branches and sciences that pertain to agriculture. Its course of study differs from that of a University, in the absence of a classical department, and in the greater attention given to those studies in the scientific course that pertain to agriculture and the arts. It differs also in the fact that it embodies with this liberal course of study, practical training in the work of the farm, its students being required to spend at least two hours of each day in labor under the direction of their instructors. Although this labor is in the direct line of their studies, they are paid for it at so much per hour. This manual labor is held to be beneficial, by the financial aid it gives to the student; by instructions in method of work; by the health derived from regular, moderate exercise, and by the correct ideas imparted as to the dignity and importance of labor.

The College is a State Institution, and is supported by the State. Its doors are therefore open, free to all with certain limitations as to age and advancement, necessary in the conduct of such a school.

It is to be seen from this that the Colorado Agricultural College is not a literary school, masquerading under the convenient title given to it, nor is it, on the other hand, merely a manual labor school. Its aim is to combine labor and science, in such a way, that one shall aid and strengthen the other. The labor must be accompanied by knowledge, the knowledge must be aided by labor. The education imparted is of the head and hand, and in proportion to the proper training of them, of the heart also. It is deemed better for health, mind, and for morals as well, that education should be thus broad and liberal.

The Department of Experimental Agriculture is of the utmost importance to the farmers of the State. When success results, it will benefit them; when failure ensues, it will save them from loss of time, labor, and expense. Here the new grains can be grown and reported upon. Here new methods of irrigation may be examined and experimented with. Here the new varieties in field and garden seeds can first be shown worthy of the farmer's attention, or discarded. The importance of this department, carefully conducted, will be of immense value in a State, where old rules and familiar methods of farming do not apply.

The complete course of instruction includes a preparatory year, and a four year's collegiate course. The student is not absolutely required to follow this course, but is allowed to select his studies. Graduation confers the degree of Bachelor of Science. Tuition is free to all students, but there is a matriculation fee of five dollars, and an incidental fee of one dollar, at the beginning of each term, which entitle the student to the privileges of the whole course. There is a dormitory attached to the College, and board is provided for those who wish it. In this home the student is boarded at cost, which amounts to about three dollars per week. The College is supplied with the leading scientific and literary publications of the day, to which the students have free access.

Institutes conducted by the Faculty, are held during the winter at different points through the State. These sessions are attended by the farmers in the immediate vicinity. Papers are read by the President, the Professors in charge of departments, by members of the Board of Trustees, and by some of the farmers, upon topics connected with the soil. Valuable papers are thus procured for general circulation, on corn, wheat, alfalfa, hay, potatoes, amber cane, fruit, floriculture, the apiary, irrigation, fertilizing, rotation of crops, stock raising, dairying, poultry, and the economies of the farm. Discussions upon each topic generally follow the reading of the paper, which are spirited, and bring out many important statements.

There is a Nursery connected with the farm, where the various forest and fruit trees are growing. The surplus products of the farm or of fruit trees and plants deemed worthy of more extended trial, are to be distributed in various parts of the State for further experiments, and the results announced for the general good.

The Faculty consists of C. L. Ingersoll, President and Professor of Logic and Political Economy; A. E. Blount, A.M., Professor of Agriculture and Botany; Charles F. Davis, B.S., Professor of Chemistry and Physics; F. H. Williams, Professor of Practical Mechanics and Drawing. The fall term commences in September and ends in December. The winter term begins in January, and ends late in March. The spring term commences early in April and closes in June. These three terms compose the year.

CHAPTER XIX.

FARMING JOURNALS.

The existence of newspapers in farming communities is a good indication of the intelligence of the people. The number and excellence of the valley journals in Colorado, is really surprising. In towns and villages of the East, where the home paper is but feebly supported, and continues from year to year barely sustaining itself, it would seem as if the people took no pride in the medium through which their special locality is made known to the outside world. In Colorado, it is just the reverse. Hardly a town of any account but has its representative press. Some farming communities sustain their two and three newspapers. These are supported with pride, copies are sent abroad to friends, and the patronage given is in no stinted measure. A list of these journals will have a positive value to those who desire to obtain information concerning the region which they represent; hence they are given here as being part and parcel with matters touching the farming interests of the State. Only those are named that represent agricultural communities; and sample copies can probably be had by those desiring them, simply by addressing the publishers.

"The Colorado Farmer and Live Stock Journal" is the only strictly agricultural paper in the State. It is published at Denver, and is devoted to the agricultural and pastoral interests of the eastern slope of the Rocky Mountains, including Wyoming, Colorado, and New Mexico. Price per annum, $2.00.

"The Tribune," Greeley, $2.00 per annum. "The Sun," Greeley, $2.00. These two journals represent the farming region of the lower Cache-la-Poudre Valley.

"The Journal," Evans, Weld County, $2.00 per annum. This paper circulates among the farmers on the South Platte, from the Cache-la-Poudre up to the county line, including Platteville, Fort Lupton, and Erie.

At Fort Collins there are two journals, "The Express" and "The Courier." Each is $2.00 per annum. They are the representative organs of the upper portion of the Cache-la-Poudre Valley, in Larimer County.

"The Reporter" is published at Loveland, in the same county, in the district through which the Big Thompson and Little Thompson streams run. Per year $2.00. The town of Berthoud is in this district.

At Longmont, Boulder County, the center of the St. Vrain farming interests, there is published "The Press" and "The Ledger," each $2.00. Also the "Home Mirror," a monthly, mainly designed for eastern circulation. Price, 50 cts.

At Boulder, in the same county, three journals are published. "The News-Courier," "The Banner," and "The Herald." Each $2.00 per annum. These represent the region including Left Hand, Boulder, South Boulder, and Coal Creek Valleys.

Golden, in Jefferson County, has two papers, "The Transcript," and "The Globe." Each $2.00 per annum. These are the exponents of the farming valleys of Ralston, Clear Creek, and Bear Creek.

The Divide has one representative paper, "The Journal," published at Castle Rock, Douglas County, at $1.50 per year. It includes Elbert County as well, and is the official organ of both counties.

El Paso County has "The Gazette," and "The Republic," both published at Colorado Springs. The first issues a daily and a weekly edition, at $10.00 and $2.00 per year.

The second is a weekly only, at $1.50 per annum. These represent the southern slope of the Divide, Monument, and Fontaine-qui-Bouille Valleys, as well as the famous watering town of Manitou, the Saratoga of the Rocky Mountains.

The Arkansas Valley is well represented in journalism. Bent County, on the extreme east, has at West Las Animas, "The Leader," representing the stock and agricultural interests of the county, and of South-eastern Colorado. $2.00 per annum. At Pueblo, the next county west, "The Chieftain" issues a daily edition at $10.00, and a mammoth weekly, at $3.00 per annum. "The Commercial Standard," weekly, $2.00 per year, is also published here. These are published in the old town, as it is called. In South Pueblo, "The News" is published daily, at $10.00 per year. These represent the interests of the Arkansas Valley and its tributaries, the St. Charles, Huerfano, and Apishpa Creeks.

Fremont County has, at Canon City, "The Record," and "The Reporter," weekly, at $2.00 per year. Among the tributaries of the Arkansas, in this county, are Currant, Grape, Cottonwood, and Oil Creeks. Florence, the great fruit-growing section is in this district.

Custer County has, at Rosita, "The Sierra Journal," weekly, at $2.00 per annum. Wet Mountain Valley, with its extensive meadow lands, lies in this county.

Still following up the Arkansas, at Buena Vista, in Chaffee County, is published "The Times," and "The Herald," each weekly, at $3.00 per annum. Though mining industries flourish in this vicinity as well as at Rosita, there is considerable farming done in the neighborhood, warranting their being included in this list.

Las Animas County, in the extreme south-eastern part of the State, has, at Trinidad, on the Purgatoire River, two daily journals, "The Times," and "The News," each issuing a weekly also; the first at $10.00 per year, the last at $1.00 per year. The Purgatoire Valley, and the Apishpa, are in this county, and in each farming is a permanent industry, though the stock interests are very large.

Crossing the Sangre de Christo Pass, in Costilla County, there is no point of sufficient prominence for a newspaper. In Sagauche County, at Sagauche, "The Chronicle" is published weekly, at $3.00 per annum. It is the exponent of the upper part of San Luis Park, including Sagauche and San Luis Valleys, with their numerous tributaries.

The upper end of the Rio Grande Valley has, at Del Norte, two weekly journals devoted to its interests, in "The Prospector," at $3.00 per annum; and "The Cactus," at the same price. State lands, unoccupied, abound in this section; but the agricultural interests are also large.

Further down, on the Rio Grande River, in Conejos County, is published "The Independent," at Alamosa, $3.00 per year. The Conejos, La Jara, Alamosa, and other tributaries to the Rio Grande, course through this section.

La Plata County, in the south-west corner of the State, has in it such valleys as Florida, Hermosa, Los Pinos, Dolores, the Animas, and others, and at Durango, "The Record" is published daily and weekly. The latter is a mammoth eight-page sheet, at $3.00, giving general agricultural information of the charming valleys in its vicinity.

In Gunnison County, on the lands of the late Ute Reservation, at Montrose, is published "The Messenger," an exponent of the wonderful resourses of the Uncompahgre Valley, $3.00 per annum.

To the foregoing list might be added a number of papers, especially those published in what is known as the San Juan country, which give farming items, from their neighborhood. But as these points are not strictly agricultural centers the papers referred to cannot properly be included in our list. Those given, show conclusively that the farming population of Colorado is also a reading one, and can safely challenge comparison with towns in the East, and communities that count their age by scores of years, while of these but few can show the beginning of a second decade.

CHAPTER XX.

CATTLE AND SHEEP.

A single chapter devoted to the cattle and sheep interests of Colorado must suffice, since these industries, though indirectly belonging to the economies of the farm, in this State are distinct and separate from agriculture. There are about one million head of cattle, with a value of at least fifteen million dollars, showing that the business must be extensive. The mildness of the climate, the vast grazing grounds on the plains, the ranges in the mountain parks and valleys, all tend to make cattle growing profitable as well as pleasant. It is said that all the good ranges are occupied, and this is probably true of the eastern side of the State, of the Wet Mountain Valley, and perhaps San Luis Park. But in the vast territory comprised in North Park, and the country beyond the main range in Western Colorado, through which the Grand and other streams course, there is much vacant territory, to be eventually occupied by cattle.

Wherever water can be obtained, a ranche and a range beyond it are apt to be found, in all the gently undulating prairie land stretching eastward from the foot-hills to the boundary line of the State.

Concerning the grasses of the plains, they are of three kinds: the Gramma grass, growing about ten inches high, in a single round stock, with two heads to it. Then comes the Buffalo grass, growing about four inches high, which is curly in its character, and lies close to the ground. Then Bunch grass, which keeps green at the roots nearly all winter. On these, cattle and sheep—unless the winter season is extraordinarily severe—subsist all the year round. The Loco Weed, for whose eradication a State bounty is provided by statute, is somewhat troublesome in early spring, it being the first to put forth the green leaves so eagerly sought for.

In Northern Colorado, Weld and Arapahoe are counties in which cattle predominate. South of the Divide, Bent, Las Animas, Elbert, and Pueblo counties return the largest number. Weld, Larimer, and Arapahoe also sustain large sheep interests. Southern Colorado, in which the largest number are kept seems to be best suited to cattle. Of late years, improved stock, both of cattle and sheep, have been introduced. No one special breed can be named. Herefords, Shorthorns, Devons, Jerseys, each have their champions who believe their favorite breed to be the one best adapted to the country. But the fact is, all do well, and amply repay investments made in them.

There exists in the State a Board of Cattle Inspectors, created by law. Two Stock Associations are in existence, one with headquarters at Denver, the other at Pueblo. Each hold annual sessions for the discussion of mutual interests. There are sixteen "round-up" districts, governed by well-defined rules and regulations. In the spring occurs the "round-up," when all the cattle spread over the various grazing tracts of country are drawn together in one herd and, with their increase, separated and taken to the ranges occupied by the different owners. Herds of improved cattle sell at from fifteen dollars to twenty-five dollars per head, according to grade. The best way to get into the business in Eastern and Southern Colorado, is to buy a ranche, a range, and a herd at one time.

The methods and profits of Cattle Raising in Colorado may be grouped together as follows, and are gathered from reliable sources:

To arrive at a clearer understanding of the method of stock raising it will be well to consider briefly the three systems of running cattle now in vogue.

First—Loose herding. This is the system of the Texas frontier, and is generally practised by stock raisers who have emigrated from that State. The cattle are turned loose on the range, with those of other owners, and a sufficient number of men are employed to guard the outskirts of the range. No attempt at an actual count of the cattle is made from year to year, but the owner arrives at the probable increase by the number of calves he brands at the annual "rounding-up" of all the cattle on the range in the spring, and at the "rounding-up" of beef cattle in the fall. It is claimed that cattle thrive better in this way, and the cost of managing them by such a system is small; but the loss by straying and stealing is not light, and to Eastern men, at least, it would be very unsatisfactory.

Second—Close herding. This system provides a sufficient number of men and horses to keep a given number of cattle within certain boundaries, and to keep an accurate account of them. It is the method adopted by many stock raisers having small herds, who came to the State from the Middle and Western States, and who have in large part preferred to run a better class of cattle, and occupy less range. The expenses are comparatively light; two men at a salary of thirty dollars a month, each, with six or eight ponies, can profitably manage five hundred head of cattle.

Third—Wire-fence enclosures. This system, now being introduced quite extensively, provides a wire-fenced enclosure for the herd, thus keeping the cattle within fixed boundaries, and dispensing with the service of several employés in the management of a large herd. While each of the two first-mentioned systems has its peculiar advantages, it is believed that the wire-fence plan will ultimately become the most popular, and it is upon this basis that the following tabulated statement has been made. By it, one man, with three horses, and the assistance of several extra hands at the spring branding—which each system requires— can care for five hundred head of cattle. But against economy in management we must take into account the interest on the money required to build the necessary length of fence, calculating ten acres to the animal, and the cost of the fence at one hundred and forty dollars per mile.

In the following table a mixed herd of five hundred head of cattle of different ages has been taken as the basis of calculating, experience having shown such a herd to be, taking everything into consideration, the best investment. The stock raiser in this way receives a more immediate return on his capital, not having so long to wait for the growth of marketable steers—usually three-year-olds, past—as where all cows are chosen for a commencement. Aside from this, it is more difficult and expensive to purchase a herd composed exclusively of one class.

Let us say, the stock raiser makes a purchase in September of a herd composed exclusively of one class.

CAPITAL INVESTED IN STOCK.

150 young cows, and calves, @ $15	$2,250 00
100 two-year-old heifers, @ $12	1,200 00
100 two-year-old steers, @ $12	1,200 00
75 yearling heifers, @ $7	525 00
75 yearling steers, @ $7	525 00
10 high-grade bulls, @ 75	750 00
Total for herd	$6,450 00

CAPITAL INVESTED IN RANCHE, ETC.

Seventeen miles of wire fence, enclosing, approximately, ten thousand acres	$2,380 00
Ranche, corrals, etc	250 00
Horses and equipments	250 00
Total	$2,880 00

SUMMARY OF ACCOUNT FOR FIVE YEARS.

Year.	*Stock.*	*Value.*	*Sales, Three-year-old Steers.*	*Expenses.*	*B'k Acc't.*
1.....	530	$ 7,140 00	100 @ $18 00....$1,800	$ 680 00	$1,120 00
2.....	655	8,465 00	75 @ 18 00.... 1,350	750 00	600 00
3.....	852	11,200 00	60 @ 18 00.... 1,080	850 00	230 00
4.....	1,063	14,620 00	100 @ 22 50.... 2,250	1,100 00	1,150 00
5.....	1,321	18,477 50	130 @ 22 50.... 2,925	1,500 00	1,425 00

Total bank account	$4,525 00
Value of stock	$18,477 50
Bank account	4,525 00
Total	$23,002 50
Capital invested	$6,450 00
Profit in five years	$16,552 50

In the above table the increase of cattle has been reckoned at eighty-five per cent., allowing five per cent. of loss from natural causes, making a net increase of eighty per cent.; but on the grown cattle no estimate of loss has been made. There would be loss, doubtless, but in the wire-fence enclosure this would be entirely from natural causes, and very light. The estimate of eighty per cent. net increase of young cattle is, in this country, as all stockmen well know, rather below the average, and as it would tend to complicate the tables to account for this slight loss on the grown stock, it has seemed best to work them out as above, thus making them simple, and as accurate as it is possible for such an estimate to be. The improvement of the stock bred from fine bulls has been reckoned at twenty-five per cent. In estimating expenses the services of one man at forty dollars a month, with several extra hands to assist in branding, etc., have been taken into account, together with the cost of feed for the horses and keeping up the requisite number of bulls. No allowance has been made for rent of land, as at the present time there is no trouble in securing a good range on the frontier for a nominal sum. In summing up at the end of five years, the cost of the fence, ranche, and corral, are valued as they were at the outset.

From this table, then, it will be readily seen that starting with a capital of ten thousand dollars, a man can easily pay his running expenses for the first five years, leaving a fair balance in the bank. At the end of that time the herd will have nearly trebled in value, and from that time on, the profits from the sale of three-year-old steers will rapidly increase.

That there is "money in sheep," goes without question in Colorado. When one-year-old lambs average four pounds, ewes five to six, and rams from twelve to fifteen pounds of wool, worth from fifteen to twenty cents, it will be readily seen that there is a large margin for profit, provided proper care is taken. Twelve years ago, but few sheep were in the State. Since that time the growth of this industry has been rapid. Then perhaps fifteen thousand were owned. Now the number nears two millions. Thorough-bred Merinos are annually brought in, finding ready sale. The yearly wool clip exceeds seven million pounds, having a value of nearly one million and a half dollars.

The following estimate of outlay and income in sheep farming for a period of three years will convey some idea of the ease with which capital doubles itself.

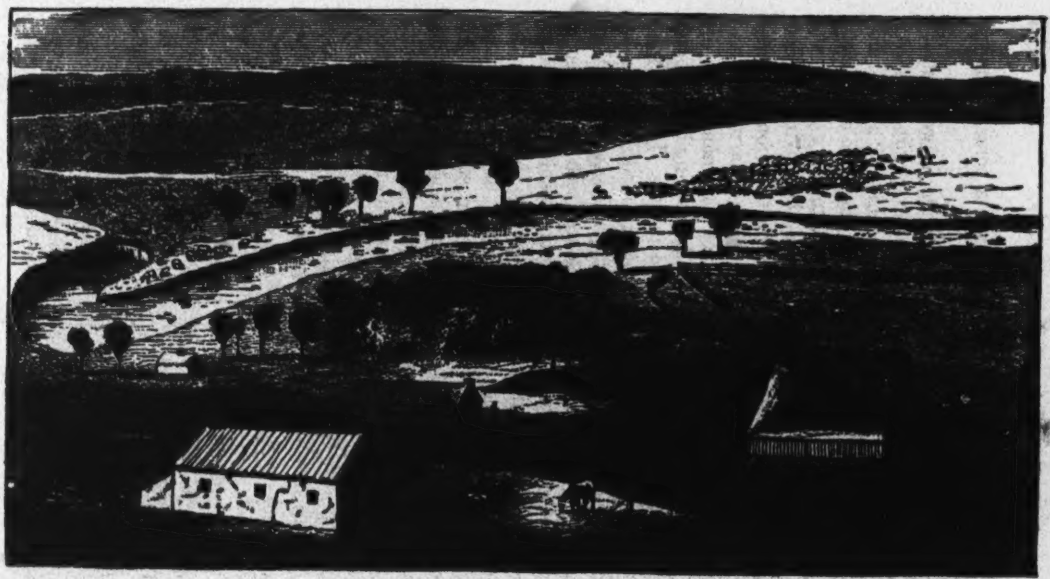
	OUTLAY.		
	1000 ewes @ $3	$3,000	
	25 rams @ $30	750	
	Wagons, teams, ranche, herders, provisions	1,500	
	Cost of shearing, extras, etc	250	
	Expenses of second year	1,500	
	Expenses of third year	2,000	
			$9,000
	INCOME.		
First Year.	Wool 5,000 pounds @ 20 cents	$1,000	
	Increase in flock 750 @ $1.50	1,125	
Second Year.	Wool 7,500 pounds @ 20 cents	1.500	
	Increase in flock 1,000 @ $1.50	1,500	
Third Year.	Wool 12,000 pounds @ 20 cents	2,400	
	Increase in flock 2,000	3,000	
		$10,525	
	Original investment	4,000	
			$14,525

This is not a bad exhibit. The next two years the profits increase very fast. There are some who claim that two hundred per cent. profit can be made. This may be true, in isolated cases, but not as a rule. Lately, in an Eastern magazine, an article on Sheep Husbandry appeared, based, as asserted, upon actual facts, gathered by the writer from those directly engaged in the business, in which, on a basis of two thousand ewes and sixty rams, with the outfit and provisions making the investment fourteen thousand dollars, the money was doubled in three years. But it is better not to be too sanguine of making such profits. If the original investment is doubled at the end of the fifth year, it is a safe and profitable industry. There are bad seasons, late springs, sudden snow storms that take the flock unawares, and serious loss ensues.

A writer on sheep husbandry in Colorado gives the following sound advice to those who propose adopting this pursuit: "Those who enter this business are advised to act cautiously, at first. It is better to learn the ways of the country and the methods pursued of caring for sheep, requisite for success, from some who are in the business. A year's apprenticeship is a wise move on the part of the man who intends keeping sheep. The knowledge thus gained will be of incalculable value. A careful selection of land for a range is necessary; some have two ranges—one for summer on the plains, and one for winter within the shelter of the foot-hills. A close attention to the business in all its minor details, will enable even those who are novices to build up a respectable fortune in a very few years by sheep raising."

In a recent number of the "American Agriculturist," there was published so excellent a descriptive account of a Colorado Sheep Ranche in Eastern Colorado, from the pen of David W. Judd, Esq., that I give it in this connection as being better than anything I can write to convey a correct impression of the subect:

Leaving Kiowa, a Kansas and Pacific railway station, thirty-one miles east of Denver, we drove eight miles over the plains in a buck-board wagon, reaching C. and W. and G. Raymond's well-known ranche at the close of a lovely October day. We were warmly welcomed by one of the three proprietors and his young wife, who, having finished her school days in New York, had come two thousand miles to grace a ranchman's home. There is a novelty and charm about this life which attract very many from the older States, and one is constantly discovering in the rough herder's garb men of education and culture. They are fond of the freedom and exhilaration of this mode of existence, which also promises health, wealth, and adventure. Very many of the herders or hired men are fresh from college; youths who are serving their apprenticeship in the occupation of sheep-raising. Others come here from the Eastern and Middle States to engage in mining operations. They are unsuccessful, become straightened for money, and take to herding because herders are in demand. Their wages vary from fifteen to thirty dollars a month, and board, according to capacity and experience. Many not only remain with their sheep during the day, but sleep near them in the corrals at night, as a protection against wolves. On three successive nights since we have been here, these wolves have made a descent upon the corral, killing several lambs. In the early days of Colorado sheep-raising, the herders were accustomed to camp with their flocks wherever night overtook them. This, however, was found to be a dangerous practice, inasmuch as the sudden storms of the Colorado plains would blind and scatter the sheep, and often lead to great loss. Sheep invariably go before a storm. Sometimes they can not be checked, but will push on to certain destruction. We recall one instance where three



A COLORADO SHEEP RANCHE.

thousand sheep in Southern Colorado, overtaken at night by a sudden storm, blindly followed their leader over a precipice, and perished in the waters below, not one escaping. Now the ranchmen have their sheep corralled at sunset, instead of keeping them out on the plains. In the engraving the sheep are represented as coming in for the night. Though generally manifesting but little intelligence, they invariably display much sagacity in wending their way toward the corral, which they know will afford them protection against wolves, and keep them warm and comfortable. The sheep soon come to know the herders, and manifest as much affection for them as sheep are capable of. It is not well, however, to have them become too tame, because they hang back and do not drive well. The thrifty owner has his sheep out of the corral and upon the plains by daylight. They feed until about ten o'clock, then "bunch up," or form a compact mass, until four o'clock, and from then they feed until driven in at dark. They eat gramma, buffalo, wire, and bunch grass. Wild hay is cut and stacked for feeding in winter, so that they may not want for food should there be a heavy fall of snow. The herders generally have horses of their own, which subsist on prairie grass, are very much attached to their owners, and become wonderfully skilled in managing sheep. Give them the rein and they will gather in and keep the flock together with as much dexterity as the shepherd's dog who accompanies them. The dog is an essential part of the "outfit," being a companion to his owner, and exercising a constant vigilance for the safety of the flock. Herder, horse, dog, and sheep, together make a very picturesque appearance as they move over the plains.

The flocks, comprising Mexican sheep and their increase from Merino rams, generally number from one thousand to three thousand. During the winter the larger flocks are generally divided in order to insure better feeding and better protection. One herder can readily manage two thousand five hundred sheep, but he has to have his wits about him constantly. The leader of the flock is generally a Mexican goat, whose prowess is recognized by the whole herd, and whose prominent figure enables him to be easily seen both by the sheep and the herder.

The Mexican sheep, as a general thing, are purchased about the first of October. The rams are turned in with them in December, and the lambing season begins about the middle of May. Shearing begins about the first of June. The Mexican sheep shear from two to four pounds, and improved sheep from four to eight pounds. Of course there are exceptions; for example:—The Willard Bros., at their shearing-match, last year, clipped thirty-two and one-half pounds of wool from one Vermont ram, which brought twenty cents a pound. In shearing sheep, great care must be exercised not to begin too early, on account of late storms. The shearers are paid from five to eight cents a sheep for their work. One man can shear from twenty to seventy sheep in a day. Mexican wool brought, last year, from sixteen to twenty cents a pound (prices are much less this year), according to the absence or presence of "kemp," a hairy, valueless substance. As sheep improve, the quantity of kemp gradually diminishes. The fleece of the native Mexican sheep is a coarse carpet wool, but as the flocks are improved by the introduction of Merino rams, the quality of the wool is improved, until many of the ranchmen now claim that it is fully as good as that grown in the Eastern States. They further maintain that when their improved sheep become disassociated in the public mind from the native Mexicans, their wool will justly command as good a price as is paid for Eastern fleece. Owing to the scarcity of water, sheep are rarely washed in Colorado, and it is stated that many tons of dirt are annually shipped east in the Colorado fleece. Until recently, the ranchmen disposed of their wool to local dealers and agents. Two years ago they began to consign it to New York, Boston, Philadelphia, Hartford, and other Eastern houses. The main disease among the sheep is scab, which is due, like the itch in man, to a minute mite, and may be communicated from one animal to another. The treatment is, to dip the sheep in some liquid that will destroy the parasite; the dipping apparatus costing from fifty dollars to one hundred dollars. The principal dip is composed of tobacco, sulphur, and sometimes arsenic and soap. Three men can dip twenty-five hundred sheep a day. Scab does not affect the wool itself, but causes the sheep to lose wool, often to a considerable extent.

While sheep-raising presents so many attractions, it is no child's play, as many coming here from the East learn to their sorrow. Drones cannot succeed in this better than in any other business. Money, muscle, and brains are required to achieve success, and the idea that owners can live in the East, and safely trust their flocks to the management of others here, has been rudely dispelled. One has got to be upon the ground, and superintend his own ranching operations, if he expects to prosper. Upon coming to Colorado, to engage in sheep-raising, a man should hire himself out as a herder, in order to learn the details. No man should embark in the business, until he has had some experience. He should be here during the three seasons, that is: lambing, shearing, and dipping. At the end of that time he will have a very fair insight into the workings, although it would be advisable for him to pass a winter here, and have an experience with one of the heavy storms. He must not take the advice of any one man, but form his judgment after conversing with various sheep-raisers. He must expect to invest not merely money, but his time and brains. He must expect to give his personal attention to the business, not simply for one or two years, but for five or ten years, until he gets his herd sufficiently well graded, to bring in a fair income from wool. He will find the stories of ranchmen to differ in many particulars. Two years ago five thousand dollars was regarded as the usual amount required in purchasing a complete sheep "outfit,"—that is—a ranche, horses, dog, sheep, and rams. He should start with about one thousand Mexican sheep, which he can purchase of dealers at Denver, and almost anywhere else. They sold two years ago for two dollars to two and one-half dollars each. They can be purchased this autumn, for from ninety cents to one dollar and fifty cents each. The Vermont rams will cost him from twenty to fifty dollars apiece. There should be one ram for every fifty ewes.

He will not be required to pay anything for his land, which belongs to the Government. Generally the buildings and ranche franchise can be purchased of some one, who, for various reasons, wishes to make a change. If the new comer locates on a new range, he will have to build a dug-out or an adobe house, and must have a wagon, a span of horses, and a shepherd dog. The corral, with accompanying shed, should be built as soon as possible. If he has his family with him, he should purchase the needed household furniture here. The rates of freight are so high, that as few effects as possible should be brought from the East. He should employ a herder to watch the flocks, while he himself keeps close guard over the rams. He must make up his mind to be absent from the ranche only a few hours at a time during any season.

In selecting a range, wood and water are the great essentials. It is for this reason that the ranches through Colorado and the other Western States and Territories are generally located along the streams and river bottoms.

Water-spouts are of rare occurrence, but they are one of the things which a new-comer should have in view when locating his ranche. The little grove of trees, seen in the engraving, are cotton-wood. This is the only thrifty tree that grows spontaneously on the plains. In addition to the wood which they supply, these cotton-wood groves afford a protection from the snow, and break the force of storms. The buildings here are made of adobe, viz., sun-baked mud. They are substantial, comfortable, and supply the place of frame houses, which are expensive, owing to the high price of timber. The dug-out in the background, was the original home of the "founder" of the ranche. It is not an uncommon thing to find a family recently from the East, temporarily occupying a dug-out, and having with them a piano and other evidences of culture and refinement.

CHAPTER XXI.

THE RAILWAY SYSTEM OF THE STATE.

Not the least important factor in the development of the agricultural resources of Colorado, has been the network of railway lines crossing the country and giving easy communication to the principal markets, as well as to points touched by main trunk lines running east and west. When I first settled in Colorado, in 1870, its capital was isolated from the civilized world. The Union Pacific system left it one hundred miles to the south. The Kansas Pacific had but just reached the eastern line, though pointed toward Denver. A road was in course of construction from Cheyenne on the Union Pacific railway down to Denver, but only fifty miles were in operation. South of Denver, the Denver and Rio Grande railway was just beginning to feel its way across the Divide, separating the South Platte and Arkansas Valleys.

Now—how different the situation.

Beginning in Northern Colorado, we find the Colorado branches of the Union Pacific railway system reaching all the farming valleys, penetrating into the foot-hills, up to the mining districts, and now making its way over the great Continental Divide, to the western border. There is no valley of any size, or country town of any importance, that it does not reach. Fort Collins, Loveland, Longmont, Boulder, Erie, Evans, Greeley, Eaton, the main farming centers of Weld, Larimer, and Boulder Counties, are on the connecting lines that give an outlet to markets south, north, east, and west.

The Julesburg branch, as it is called, enters Colorado at the extreme north-east corner of Weld County, and follows the course of the South Platte, all the way to Denver. Hitherto this large valley, with an abundance of meadow lands and arable areas, was so distant from market facilities as to be practically useless and without value; but within the last two years there has been a wonderful change, and all along its course new towns and farming settlements are being established on Government, Railroad, and State lands. The Colorado Central branch skirts the foot-hills from Golden, in Jefferson County, north; traversing the farming districts in Boulder, and Larimer Counties, crossing the valleys of the Boulder, St. Vrain, Big Thompson, and Cache-la-Poudre, on its way to Cheyenne. The Denver Pacific branch, starting from Denver, goes further out upon the plains; follows the course of the South Platte River to Evans, where it leaves it, crossing the Cache-la-Poudre at Greeley, passes the new town of Eaton, and thence runs north to Cheyenne. By either of these branches, Cheyenne and the eastern and western markets on the main line of the road are reached. By the Kansas Pacific branch, the market of Kansas City is within reach. This road is at present used more for cattle than the cereals, but the day may come, when it will be found serviceable for the transportation of surplus grain.

The domain of the Denver and Rio Grande railway is in Southern and South-western Colorado. The Baby Road, as it was termed in 1871, has become a Giant in 1882. It is not yet full grown. It is a study, even to glance at its completed lines and spurs, while those in course of construction and in contemplation, are so numerous as to cause wonder. From Denver to Durango, in the farthest corner of the State, in the south-west, it penetrates, reaching the fair valleys of La Plata County, through rocky canons and over mountain passes, that once it seemed impossible to cross, even by trail. The fair valley of the Fontaine-qui-bouille, on the banks of which the beautiful City of Colorado Springs is located, is traversed by the main line. From Pueblo, west, the course of the Arkansas River is followed, through fertile lands and grass-grown vales, until Buena Vista is reached. Wet Mountain Valley is reached by a branch road from Canon City. The main line, crossing the Sangre de Christo range at La Veta Pass, dips down into the splendid San Luis Park, and at Alamosa touches the Rio Grande del Norte; at this point a branch goes up the valley to the very edge of the Continental Divide, passing Lariat, and Del Norte. The main line, turning south at Alamosa, goes down to the border line of New Mexico, thence westward, crossing the pleasant valleys of the San Juan, Piedra, Florida, Las Animas, going up this last-named stream until it reaches Silverton, in the great silvery San Juan country. The Utah Division, from Salida, crosses Marshall Pass, and then descends into the valleys of the Uncompahgre, Gunnison, and Grand Rivers, passing through what has been not inaptly termed the New Colorado, where at least half a million acres of arable land, more than bountifully supplied with water for irrigating purposes, await the coming of those who shall make an apparent wilderness bloom and blossom as the rose, and where in the near future, thousands of happy homes are to be founded, and the material wealth of the State greatly advanced by the yearly products of a soil capable of raising everything in the line of vegetables, fruits, and cereals. From this point the road goes on to Utah, reaching Salt Lake City.

It will be seen by the foregoing, how extensive is the operating system of this railway, and it can well be understood what effect it has upon valley lands far in the interior, that were almost valueless on account of isolation from markets before its coming. As has been remarked by a writer on Farmers and Railroads, "without railroads we find cheap land, cheap produce, and cheap labor; with them we find a remarkable and almost immediate improvement in all directions." Nowhere is this more noticeable than in Colorado.

The Atchison, Topeka and Santa Fé railroad traverses the south-eastern portion of the State, principally in Bent, Pueblo, and Las Animas Counties. From the State line it follows the fertile valley of the Arkansas to La Junta, where the main line branches to the south on its way to Santa Fé, New Mexico, passing up Purgatoire Valley, to the coal section about Trinidad. A branch continues west from La Junta, still following the course of the Arkansas, until Pueblo, the metropolis of Southern Colorado, is reached. From this point a third rail on the Denver and Rio Grande railway enables it to reach Denver, without transfer of passengers or freight. By this line the farmers of south-eastern Colorado reach the markets of New Mexico.

The extension of the Chicago, Burlington and Quincy road from its terminus at the Missouri River, by the construction of the Burlington and Missouri River railway in Nebraska, from the river direct to Denver, opens communication with more distant markets. The road enters Colorado in Arapahoe County, follows up the course of the Republican River, enters Weld County, touching the South Platte River and following its course up to Denver. This opens up to market a vast region, hitherto used only as grazing ground for cattle. At present but few settlements are on its line; at Akron, one of its stations, the National Government is experimenting in sinking an artesian well. If successful, it will change the condition of the north-eastern part of Colorado very materially. On the Republican, as well as on the South Platte, on the line of this road, the State owns large tracts of land that can be leased or purchased (conditional upon constructing irrigating canals) by individuals or corporations. For Colorado people this road has one point of vantage. When the time comes, if ever it should, for farmers to seek distant markets for their surplus produce, it presents the Chicago market, one thousand and fifty-three miles away, to be reached without breaking bulk. At present this advantage accrues to passenger travel.

The Denver and New Orleans railroad, lately begun, with its line at present only operated to Pueblo, has before it an important future, reaching to the far South with New Orleans as its objective point. It is intended to build this road to the Canadian River, where it will connect with one already nearly finished, having its starting point at New Orleans. On its way to the Canadian River, this line of railway will touch the valley of the Purgatoire, and the town of Trinidad, and possibly extend a branch up the valley west, through Stonewall Valley and the passes beyond, reaching the mining districts located west of the Spanish Peaks. At present it gives an outlet to the produce raised in the eastern section of the Divide, in Elbert, and Douglas Counties; points that have hitherto been lacking in facilities for the convenient transportation of crops.

It will be seen from the foregoing that the railway system of Colorado has its importance to farmers, as well as to merchants and miners. There are some who cry down railroads and consider them a disadvantage to the country. But the more intelligent portion of the people everywhere are beginning to realize that they confer vast benefits upon the country at large. But for the great Trans-Continental railway, Colorado might still have been a *terra incognita* to the East. But for the Union Pacific railway of branch lines in Northern, and the Denver and Rio Grande railway in its Southern borders, Colorado might have been known to day only as a Territory, instead of one of the most promising and prosperous States of the American Union.

CHAPTER XXII.

GARDEN CULTURE BY IRRIGATION.

As may well be supposed, where all the cereals and small fruits grow to perfection, the culture of vegetables becomes an industry, giving employment to a large number of gardeners. Especially is this true in the neighborhood of large towns and cities. Everything in the line of vegetables grows to perfection; the quality is good, the yield prolific, and the net returns to the grower very satisfactory. Some of the worms and insects that have become a pest in the Eastern States, have found their way to Colorado, and made themselves troublesome to the gardener. But, as yet, no serious complaint has been made, and the per cent. of loss is small, hardly to be noticed in the abundant yield.

Last year a canning establishment, located in Denver, began canning tomatoes, and it is altogether probable that this is the beginning of an industry that will, ere long, furnish employment for a large number of gardeners.

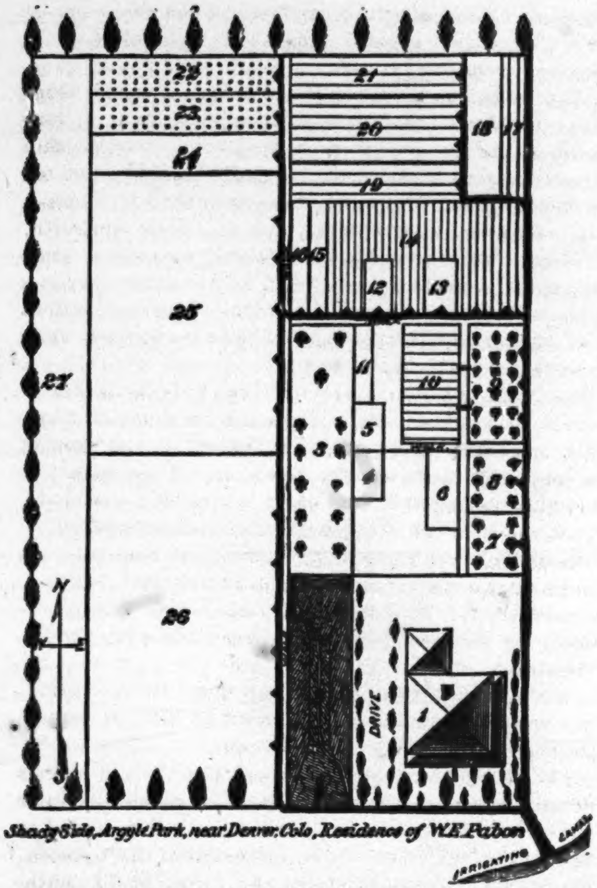
As an account of the method of irrigating gardens may be of interest, I append a paper upon the subject, which appeared in the "American Garden," of New York, in Nov., 1882. The paper being based on my own personal experience, it will, I trust, give a clear idea of what many erroneously suppose to be a difficult and laborious task:

Garden work and fruit culture in Colorado must be planned to meet the requirements and conditions of its peculiar climate, and as these include irrigation, it is desirable that the land selected for a garden, or for a fruit plantation, should be as level as possible, as more or less additional expense and labor are involved on irregular, or sloping ground.

Shadyside, the residence of the author, located about two miles from the city of Denver, is a block of four acres, having the good fortune to lie close to the main irrigating canal that waters a strip of country about ten miles long, and from one to three miles wide. Trees—cottonwood or lindens—border the south, west, and north, making a complete shelter-belt, leaving the eastern side with a full exposure to the sun. The house is set in a grove of trees of ten years' growth. Over the eastern half of the land there is a gentle slope to the west, while the western half is fairly level.

The main canal, passing within two rods of the south-east corner of the land, is tapped by a flume of wood, laid level with the bottom of the canal, and passing through the berme on the lower side of the canal; at the end entering the canal there is a wooden head-gate, made to lift, to allow the number of inches required, to pass under it and through the flume; this head-gate can be dropped down when water is not being used, shutting it entirely off. Five inches of water is used during the season at Shadyside; by this I mean the amount that would pass through an orifice one inch deep and five inches wide, or two inches deep and two and a half inches wide, as the case may be. One inch is usually considered sufficient to water one acre.

The heavy black lines represent the shallow laterals running alongside the various beds in which the water taken from the main canal flows, and which is tapped at various points to meet the requirements of the occasion. For instance: Water is let into the garden at the south-east corner, allowed to flow down the fence line until it reaches plot 7, which is a bed of rhubarb, or pie-plant; here, at a central point, a temporary check to the water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IRRIGATING
CANAL

Shady Side, Argyle Park, near Denver, Colo, Residence of W. E. Pabor

Explanations.—1. House; 2. Flower garden; 3. Chicken run; 4. Barn; 5. Chicken house; 6. Cow corral; 7. Rhubarb bed; 8. Grape-vines; 9. Asparagus bed; 10. Experimental garden; 11. Hay-stack; 12. Water-melon patch—Bean-row border; 13. Musk-melon patch—Bean-row border; 14. Kitchen garden—variety of vegetables; 15. Tomato patch; 16. Cucumber patch; 17. Rows of pole Beans; 18. Turban Squash bed; 19. Strawberries; 20. Currants; 21. Strawberries; 22. Raspberries; 23. Blackberries; 24. Cauliflower and winter Cabbage; 25. Onion patch; 26. Currant and Gooseberry plantation; 27. Alfalfa strip.

is made by damming the channel; two or three shovelfuls of dirt are generally sufficient for this purpose. By making an opening in the west bank of the lateral, at the point indicated by <, the water, thus diverted, flows into the rows of rhubarb, until enough is let in to fully saturate the ground, say for half an hour, in which time it will sink several inches in the sandy loam of which the soil is composed. Then the temporary dam is removed, the cut in the bank filled up, and the water allowed to flow along until it reaches the patch of grape-vines, where the same process is repeated; then to the bed of asparagus; this, being larger, will require two or three openings, so the dam is built at the farther corner of the bed, and these openings made for the water to flow through into the rows. Plots 7, 8, and 9 have young fruit trees growing in them—apple, pear, cherry, etc. The water from this bed that does not soak into the ground is allowed to flow through a couple of small, wooden flumes set in the walk, into the plot numbered 10, which is a sort of experimental garden, where new and choice varieties of seeds are tested. The ground here being perfectly level, the water will run down a row and then run back in another row, until several are filled. A furrow is run in each row; I generally use the Firefly plow and find it answers the purpose very well.

When these beds are fully watered, the dam is removed and the water allowed to turn to the west, along the plot numbered 14. This is the kitchen garden, where all kinds of vegetables are grown for home use, mainly in rows. The plots 12 and 13 are melon patches, in hills, with a border of wax beans banked up on the outer side, so that the water can completely cover the space allotted for melons. The plots 15 and 16 are tomato and cucumber beds, also in hills. The rest of the plot is cultivated and planted in rows. This last summer I had corn, parsnips, carrots, beets, lettuce, radishes, peas, beans, nasturtiums, melons—musk and water,—turnips, red cabbage, Savoy, kohl rabi, summer cabbage, onions, chufas, peanuts, tomatoes, and cucumbers, growing in this plot of ground, in abundant supply.

In irrigating this ground, a check, by damming, is made about every rod, and eight or ten rows of water can be seen running down the rows at the same time. The furrow is run as close as possible on one side of the row of vegetables, in order to allow the water to seep down close to the roots of the growing plants. It takes but a short time to fill these channels, and the shining currents of water, glistening under a summer sun, are a beautiful sight to see, aside from the usefulness of the mission upon which they journey.

When the water has passed the rows and reached the tomato and cucumber patches, it flows into zig-zag furrows run by the "Firefly," so as to circle around each hill. The water easily flows in them all, seeping and spreading on each side, and penetrating the ground several inches, until the beds are thoroughly saturated.

When this pleasant work is completed, the lateral running west is cut off and the water allowed to flow north again, until it reaches the plot marked 17, where three rows of bean-poles, about thirty in a row, show the Cranberry and Lima growing luxuriantly. Down these rows it runs, flowing over into plot 18, where a patch of Turban squashes are growing. From this it falls into the lateral running along the east line of plots marked 19, 20, and 21. The first-named is a bed of Crescent Seedling and Jucunda strawberries; number 20 has eight rows of Red Dutch currants, twenty-five in a row; number 21 is a bed of Wilson strawberries. All these are grown in rows, and their irrigation is an easy task.

Now, as will be seen, the entire east half of the garden has been well watered, about half a day being consumed in the work.

We now come to the west half. The water is turned from flowing into the channel on the east side of the garden, and allowed to run down a lateral outside of the south fence fronting the house, until it reaches the farther side of the drive-way and the corner of the flower garden, where it flows into and out of one bed into another, as shown in the map. These five beds have raised walks about and between them, so that they are lower than the surrounding surface and a system of flooding is followed. A better plan, however, and one that will probably be followed hereafter, is to attach a garden-hose to the force-pump at the kitchen door, with a sprinkler attached. But the flooding method was pursued this last summer with good success.

Lying west of the flower garden is a newly made currant and gooseberry plantation: one thousand bushes of the first, one hundred of the last. These are in rows of twenty-five each, four feet apart. To irrigate these, the volume of water is allowed to flow past the south end of the flower garden, turning north at the corner of the currant rows, and running along their eastern edge. Here the water, dammed at convenient distances, fills up furrows thrown up with a ten-inch plow, and flows off into plot 27—an afalfa bed.

When these are well watered, the dam is removed and the current carried further north, where over a hundred rows of seed onions are growing. Here the ground is kept fairly level, though there is a slight slope to the west. Rows are made eighteen inches apart, and at every tenth or twelfth row, sectional dams are made with earth, into which the water runs until it flows into and fills all the channels made in the rows; then the first dam is removed and the process repeated, section by section, until the bed is all irrigated, the surplus water going into the afalfa patch.

Plot 24 contains rows of winter cauliflowers and cabbage, and takes the water next, the same method being pursued. It then passes on until it reaches plot 23 and 22, where raspberry and blackberry bushes are set in rows. As these are as yet young plants, the large space of ground they occupy has been utilized by planting cucumber pickles and squashes between them, in a line with the bushes, so that the water, as it flows past, is made to do double duty.

As has been noted, all the waste or overplus of water, from 22, 23, 24, 25, and 26, flows into the strip of alfalfa on the western side of the garden, which, from this cause, generally gets moisture enough without any further labor on the part of the gardener.

The time and labor involved in thus irrigating a plot of four acres is neither long nor tiresome. It is more in the nature of a pleasure. In one day a thorough saturation of the ground, sufficient for a week, can be given. The only implement required is a long-handled shovel, to break and fill up banks, check laterals, and guide the rapidly running water into the furrows provided for it. Through the season some rainfalls may be counted on, so that two or three weeks may pass without requiring irrigation.

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